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SURGERY
GYNECOLOGY AND OBSTETRICS

Section

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INTERNATIONAL ABSTRACTS OF SURGERY

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ABSTRACTS OF CURRENT LITERATURE

SURGERY OF THE HEAD AND NECK

HEAD

Treatment of Developmental Malformations of the Jaws. JOHN M. CONVERSE and H. H. SHAPIRO. *Plastic & Reconstr. Surg.*, 1952, 10: 316.

Methods for reconstructive surgery of malformations differ from techniques employed in the correction of mandibular and maxillary defects caused by injury or malignancy. Unlike the surgical treatment of these conditions, conflicting opinions persist with regard to corrective surgical methods employed in developmental malformations of the jaws; such conflict is exemplified by a multiple descriptive terminology and a variety of corrective techniques.

Although many deformities of the mandible are associated with malocclusion, in hypertrophy or underdevelopment of the symphysis or mandibular angle the articulation of the dentition is usually satisfactory. Developmental malformations of the maxilla are often associated with malocclusion. A large percentage of jaw deformities associated with dental malocclusion, especially in children, respond to orthodontic treatment with excellent results.

The diagnosis of jaw malformations, based on a study of appearance, photographs, and casts, depends to a large extent upon standards of comparison, these being conditioned by racial, environmental, and cultural considerations. Examination of the dentition and a study of the casts of the dentition are requirements in determining the type of malocclusion of the teeth. In planning corrective procedures, prominent or interfering cusps of teeth, as indicated on the articulated casts of the dentition, are reduced by grinding in order to obtain optimal cuspal relationships and a balanced occlusion following surgery. The success of surgical procedure, sectioning the ramus or the body of the mandible, is partly dependent upon a postoperative balanced occlusion. It may be necessary to remove one or more teeth. When this procedure is indicated, the extractions should be done previous to osteotomy.

Many techniques have been advocated for the surgical treatment of jaw malformations. Sectioning the ramus in favorable cases is an advantageous procedure because the dentition remains intact. The ramus may be sectioned at various levels. Osteotomy through the body is the method of choice when one side of the mandible requires elongation, in some cases of prognathism, and in open bite. The body of the mandible may be sectioned without extracting a tooth in cases in which roots of adjacent teeth are separated by sufficient alveolar bone to permit osteotomy without injury. The simplest method for elongating the body of the mandible is Kazanjian's L-shaped osteotomy. Step osteotomy with resection of a bone segment to shorten the body may be employed and osteotomy to shift segments of the body of the mandible with restoration of contour with bone grafts, or prostheses, or the resection of hypertrophic bone.

Maldevelopment of the maxilla, resulting from childhood injury, may involve either the entire maxilla or the bone on one side only. The re-establishment of adequate dental occlusal relationships is an essential step in the restoration of facial contour. This may entail moving a segment of the alveolar process backward in cases of protrusion, or it may involve the advancement of the maxilla in cases of maldevelopment.

The operations are illustrated and case examples are described. STEPHEN A. ZIEMAN, M.D.

Plastic Treatment of Facial Paralysis (Paralisis facial; tratamiento plastico). HECTOR MARINO. *Bol. Acad. Argent. cir.*, 1952, 36: 557.

Although the surgical correction of facial nerve palsy is followed by improvement in a large number of cases, in no instance is the result truly perfect. The lapse of time before surgery cannot be too prolonged, or permanent muscular atrophy occurs; furthermore, there is always danger of corneal ulceration if the superior facial branch is involved, with resulting lagophthalmos, lacrimation, conjunctivitis, and keratitis.

In general, three groups of techniques are available: skin plasties, tendo-aponeurotic plasties, and

muscular plasties. Skin plasties are reserved for adults and the aged and result, at best, in slight cosmetic improvement with no functional benefit. Tendo-aponeurotic plasties are especially applicable for simple suspension of the angle of the mouth and lips, and result in improved appearance, phonation, and mastication. The technical steps of Blair or Brown are equally satisfactory; fixation of the fascia lata to the masseter is also adequate. Combinations of fascia and cutaneous plasty have been used satisfactorily by the author; however, the late results of these plasties have not been satisfactory. Muscle plasties utilizing those muscles innervated by the trigeminal nerve and employing the preauricular incisions of Halle have definite indications; it is a major operation and the patient must be a good risk. Both masseteric and temporal muscle have been used. If the muscles fail to reach the angles desired, additional length by fascia lata is necessary. In spastic paralysis, the author employs a selective neurotomy of the healthy side to avoid excessive traction upon the operated side.

MIGUEL DROBINSKY, M.D.

EYE

A Simplified Blaskovics Operation for Blepharoptosis. RAYNOLD N. BERKE. *Arch. Ophth.*, Chic., 1952, 48: 460.

The author presents a simplified operative procedure for ptosis that has been used successfully in a series of 91 cases. He describes the classical Blaskovics operation and shows his modifications, which consist of (1) an easier way of reflecting the conjunctiva, (2) an easier and more certain method of separating the levator aponeurosis from the septum orbitale, (3) a procedure for eliminating one complete set of extraneous sutures for a more certain method of freely dissecting the levator from its attachments, and (4) a safer method of covering the cornea after the operation.

Better correction was obtained by the author in cases of acquired ptosis than in cases of congenital ptosis. The best results were obtained in patients with good levator action and fairly normal superior rectus muscles. He formulated no rule to be followed regarding the number of millimeters of resection as compared to the millimeters of ptosis, but advised excising enough levator muscle to raise the ptosis above the limbus. The complications which may follow the operation are: (1) temporary overcorrection, (2) superficial keratitis, (3) lagophthlamos on looking down, and (4) occasional extraocular muscle anomalies.

The anatomy of the upper lid is reviewed, and the minute details are thoroughly covered and illustrated.

EARL H. MERZ, M.D.

Ocular Effects of Methonium Compounds. A. J. BARNETT. *Brit. J. Ophth.*, 1952, 36: 593.

The author has investigated the effects of methonium compounds on the eye, when given for hypertension. He divides the effects into immediate ocular changes and changes over a prolonged period.

The patients were given intramuscular injections of pentamethonium or hexamethonium—2 mgm. per kilo of body weight.

The immediate effects were: (1) lowering of intraocular pressure; (2) loss of accommodation in some patients; and (3) slight dilation of the pupils.

The effects of prolonged treatment were: (1) improvement in retinitis; (2) reduction of the edema and elevation of swollen nerve head; and (3) reduction of intraocular tension.

The author suggests that the drug has definite value in cases of retinitis due to hypertension, and may be of value in the treatment of glaucoma.

EARL H. MERZ, M.D.

Experimental Research with Corneal Heterographs. J. BABEL and J. B. BOURQUIN. *Brit. J. Ophth.*, 1952, 36: 529.

A corneal graft, 5 mm. in diameter, full-thickness or split, was inserted in a slit made in the stroma of a rabbit's cornea. The donor graft was taken from various species: ox, sheep, horse, pig, guinea-pig, rabbit, and man. Of a total of 30 heterografts, 14 were successful. In 12 eyes the heterograft remained clear throughout the period of observation (3½ months). These included 4 ox (anterior portion, 3; posterior, 1), 2 horse (anterior, 1; posterior, 1), 1 guinea-pig (total cornea), and 3 sheep (total, 1; anterior, 1; posterior, 1).

In heterografts applied to both eyes in succession, corneal opacification is nearly always produced in the second eye. The reaction phenomena appear to be of an allergic type. When these interlamellar heterografts are well tolerated, they remain clear, but when a defense reaction ensues the grafts become opaque soon after their introduction. Edema of the surrounding stroma and a pannus-type vascularization then develops; finally the graft itself is invaded by newly formed vessels.

JAMES E. LEBENSOHN, M.D.

Successful Transplantation of Human and Cat Corneal Tissue into Rabbit Corneas. D. P. CHOYCE. *Brit. J. Ophth.*, 1952, 36: 537.

Lamellae of corneal tissue superficial to Descemet's membrane from human and cat eyes were successfully grafted into rabbit corneas. The graft was inserted along the plane of cleavage between Descemet's membrane and the deeper layers of the substantia propria, no sutures being used. The graft is rarely dislodged with this technique.

The present study includes 9 cases with donor material from cats and 5 cases with human donor material. The postoperative course was similar throughout and resembled that in homotransplants. Transient interstitial keratitis occurred at the extremities but did not involve the central area. At observation 6 months later the corneas had all healed well with central transparent areas of even surface through which an undistorted view of the rabbits' fundi was

obtainable. After a period of 2 years the site of operation was hard to make out, so well had the grafted tissues been assimilated. All evidence of keratitis, including ghost vessels, had disappeared and the eyes operated upon were almost indistinguishable from their unoperated fellows.

Histologic examination indicated that every component of the heterograft had been replaced by host cells without any disturbance of transparency. Experimental lamellar heteroplasties have been proved possible in the rabbit, but it would be premature to conclude that because human corneal tissue can be grafted successfully into the rabbit cornea that the reverse is also true. JAMES E. LEBENSOHN, M.D.

Posterior Exudative Iritis. BERNARD SAMUELS. *Am. J. Ophth.*, 1952, 35: 1685.

Posterior exudative iritis is not an uncommon condition: it occurs when toxin from the posterior chamber irritates that side of the iris and causes an exudation into the deep layers of the iris and into the chamber. Clinically, it runs through its active stage unrecognized, being concealed beneath the anterior layers of the iris. Histologically, one of its earliest signs is the appearance of a cell-free albuminous fluid and fibrin in the aqueous of the posterior chamber. The focus of infection is in the vitreous cavity at a greater distance from the iris than conditions causing anterior iritis. The iris is thus subjected to a stimulus of relatively low intensity for a prolonged period, which produces lymphocytes in addition to an overwhelming number of polymorphonuclear leucocytes. Clinically, the exudate organizes and contracts during the second, third, and fourth weeks after an injury or operation. Special attention should be paid to the depth of the periphery of the anterior chamber, as its increased depth may be the first sign, aside from decreasing vision, of a badly infected vitreous cavity.

FRANK W. NEWELL, M.D.

Inherited Retinal Detachment. JACK LEVY. *Brit. J. Ophth.*, 1952, 36: 626.

Two pedigrees consistent with x-chromosomal inheritance and not associated with myopia are presented. In the first pedigree, all 7 cases of retinal detachment occurred in males and transmission was through unaffected females. Affected members of the family showed a macular lesion, cystic detachment of the retina, vitreous veils, and dendritic white lines. The majority of patients were hypermetropic but 1 patient was emmetropic, and 1 showed mixed astigmatism; 2 had convergent, and 2 had divergent strabismus. Three members of a second family showed retinal detachment with evidence of x-chromosomal inheritance, much less strong. In this family the detachments did not differ from the usual detachment with disinsertion. One patient in each of the two pedigrees was operated upon but without cure of the detachment.

In the first pedigree, even if surgical cure was accomplished, there would be no improvement in central vision because of the macular lesion. The author suggests that an inherited macular defect associated with a tendency to retinal detachment is sometimes responsible for the poor central vision associated with detachment following its surgical cure, and that x-chromosomal inheritance might partly explain the preponderance of cases of detachment in males. FRANK W. NEWELL, M.D.

Lamellar Resection of the Sclera in the Treatment of Detachment of the Retina. MILTON L. BERLINER. *Arch. Ophth.*, Chic., 1952, 48: 596.

The author proposes a surgical treatment for retinal detachments in which the standard classic methods are deemed inadvisable.

The operation conists of removing the outer one-third to one-half of a scleral strip 2 to 3 mm. in width and extending to about one-third the circumference of the globe. The strip is taken from over the tear or disinsertion, and runs parallel to the limbus. The remaining inner layer of scleral strip is cauterized with light cautery from a ball electrode. The area around the resection is cauterized with 1 to 1.5 mm. perforating diathermy. Subretinal fluid is allowed to escape. After the globe softens the scleral wound is closed with black silk sutures causing an infolding of the surgically thinned sclera. This reduces the content of the globe from 10 to 15 per cent and allows the thinned retina to approximate the sclera.

Indications for this operation are: (1) shrinking and retraction of retinal vitreous, (2) fragile retina, (3) high myopia, detachment, and giant tears, and (4) after relapses from classical procedures.

EARL H. MERZ, M.D.

The Pathology of Early Retrolental Fibroplasia. ALGERNON B. REESE, FREDERICK C. BLODI, and JOHN C. LOCKE. *Am. J. Ophth.*, 1952, 35: 1407.

A microscopic study of 10 cases of retrolental fibroplasia, which terminated fatally at from 41 to 125 days after birth, are reported. Prior to death the eyes had been examined repeatedly with the opthalmoscope and the presence of early retrolental fibroplasia was definitely established. In addition, the authors discuss the results of the histologic examination of 458 eyes of stillborn infants or of premature infants who died a few days after birth. The changes seen in retrolental fibroplasia are remarkably similar in all of the eyes. Progression of the disease appears to follow a well defined pattern. The process is at first confined to the nerve-fiber layer of the retina in the equatorial region. Here are found a diffuse thickening due to small nests of endothelial cells and an increase of the glial elements. These changes were not appreciated clinically and only the accompanying tortuosity and dilation of the retinal veins were seen. The proliferated endothelial cells canalize and break through the internal limiting membrane. Hemorrhages occur from the newly formed vessels, and then organization, contracture, and folding of the retina. Masses of angiomatous tissue creep be-

tween the retina and the hyaloid membrane of the vitreous and then invade the vitreous proper. Ultimately the greater part of the retina becomes involved and is folded and detached from contracture.

Secondary complications, such as glaucoma, ensue. The area of ora serrata was not involved in any of the cases. The internal limiting membrane was normal throughout. There was no evidence to indicate that an inflammatory process was a factor or that nonattachment of the retina played a rôle.

Autopsy of the infants revealed no findings that could be correlated with retrolental fibroplasia.

Among 194 eyes of known premature infants with a birth weight ranging from 300 to 350 gm., only 4 cases were found which showed pathologic changes completely identical with those described as found in early retrolental fibroplasia. No correlation could be found between dilation of the capillaries of the larger vessels and the early stages of retrolental fibroplasia. There was no correlation between changes of the internal limiting membrane and the birth weight of the infant.

The authors conclude that the early basic change in retrolental fibroplasia is a neovascularization which extends from the nerve-fiber layer of the retina toward the vitreous. This neovascularization may assume angiomatous proportions and, when it does, microscopically it has the histologic characteristics of a hemangioma. The earliest retinal changes manifest themselves first in the equatorial region, which is about the clinical limit of visibility with the ophthalmoscope. Since it is probable that in the development of the premature eye the retinal blood vessels have only reached this region, the endothelial proliferation and the neovascularization should indicate the termination of the retinal system.

FRANK W. NEWELL, M.D.

Retrolental Fibroplasia: A Survey. LEONA ZACHARIAS. *Am. J. Ophth.*, 1952, 35: 1426.

Retrolental fibroplasia, which occurs almost exclusively in premature infants, is now regarded by most observers as a disease of the retina and vitreous which is a definite clinical entity, separable from other pathologic processes which produce similar end results of the retinal and vitreous disturbance.

The acute phase of the disease includes retinal vessel dilation and tortuosity, vitreous hazing, retinal edema and transudation, hemorrhage into the retina and vitreous, neovascularization, retinal detachment, and retrolental membrane formation. The residua of the acute phase may consist of retrolental membranes or masses of varying extent, optic disc malformations, optic atrophy, pallor and pigmentation of the fundus, attenuation of the retinal vessels, shallow anterior chamber, elongation or dislocation of the ciliary processes to give a peripheral dentate appearance, posterior synechias, corneal opacities, cataract, secondary glaucoma, microphthalmos, endophthalmos, nystagmus, photophobia and myopia. The retrolental mass is composed of detached retina, angioblastic tissue, and organized vitreous material. The earliest pathologic changes appear only in the nerve-fiber layer of the retina, but in localized areas the capillary endothelium shows marked proliferation. In more advanced clinical lesions, the nerve-fiber layer is thickened to many times its normal size. The newly formed capillary strands extend through the internal limiting membrane. In still more advanced lesions, the retina is detached in small folds, the summits of which are bridged by newly formed vascular meshwork.

The disease must be differentiated from other conditions which likewise produce disorganization of the retina and vitreous, such as persistence and hyperplasia of the primary vitreous, pseudoglioma, toxoplasmosis, retinoblastoma, retinitis proliferans, retinal dysplasia, congenital pigmentation of the retina, metastatic retinitis, septic endophthalmitis, tuberculoma of the choroid with retinal detachment, massive serous peripheral choroiditis, angiomatosis retinae, diabetic retinopathy, Coats' disease, dictyoma retinae, and coloboma of the optic nerve.

Most observers report that the first signs of activity are the acute phase which is visible ophthalmoscopically between 3 and 6 weeks after birth. If vitreous hazing is regarded as a first physical symptom, the onset may be noted as early as the first 10 days of life. The duration of the acute phase is set variously at 3, 4, and 5 months, at which time the activity is regarded as having subsided. Pathologic changes have been seen considerably earlier than observable clinical changes.

The acute phase of retrolental fibroplasia may subside spontaneously with or without subsequent improvement. All gradations in severity from very slight damage to complete membrane may be found, and the degree of damage depends upon the extent of involvement during the acute phase. There may be a difference in the degree of involvement in the two eyes. There is universal agreement that retrolental fibroplasia is primarily a disease of premature babies and, therefore, of babies of low birth weight.

All investigators agree there is no evidence that the disease is of a hereditary nature. There are almost no reported instances in which retrolental fibroplasia has occurred in siblings other than in twins. It is possible that the disease is more commonly found in whites, in spite of the fact that there is a higher percentage of premature births among negroes.

The question of whether retrolental fibroplasia is of prenatal or postnatal origin is regarded as still unsettled. Supporting the belief that it is of prenatal origin are the findings that the initial pathologic processes in the retina are present at birth and serve as a predisposing factor for the matrix. In contradistinction to this view are the findings that no evidence of the disease was found in 214 premature infants examined at birth. The author believes that retrolental fibroplasia is a disease of prematurity itself, regardless of the cause of prematurity, and this supports the argument for a postnatal origin.

The incidence of the condition in general is reported to be rising, although there are marked fluctuations in its occurrence. The disease is appearing in places outside the United States, where it has been watched for but not previously seen. The increase in the number of cases of retrolental fibroplasia is out of proportion to the rise in rate of survival of premature infants during the past decade. There is no correlation between retrolental fibroplasia and any specific maternal disease, either metabolic or infective, during or before pregnancy. There is no correlation with season, with multiple birth (except that multiple births are often premature), with sex, or with the necessity for resuscitation, the presence of cyanosis, asphyxia, sternal retraction, birth injuries, jaundice, diarrhea, body temperature, or rate of weight gain.

Some investigators believe that skin hemangiomas occur more frequently in premature infants with retrolental fibroplasia than in premature infants in general, but this is not generally accepted. Exposure of the premature infant to light is probably not a factor. The questions of whether there is a correlation of the incidence of the disease with the use of cow's milk or breast milk, and whether blood transfusions have any effect are unsettled. The administration of large doses of vitamin A in a water-miscible form did not prevent the development of retrolental fibroplasia. When multivitamins and iron were excluded from an infant's diet, the incidence of retrolental fibroplasia was unchanged. The results obtained by various research groups with the use of vitamin E, prophylactically and therapeutically, have been discouraging. The use of oxygen has proved controversial; some authorities regard it as a preventative and even a cure, while others believe it may be a possible cause of the retrolental fibroplasia.

There has been virtually no investigation into the possibility of the condition being caused by infection, although many authors have suggested that it is caused by an organism, possibly a virus.

Corticotropin and cortisone have been tried therapeutically and apparently have no affect on the course of the retrolental fibroplasia, and this form of treatment has been abandoned by most groups.

FRANK W. NEWELL, M.D.

Retinoblastomas in Six Siblings. WILLIAM E. SOVIK. *Am. J. Ophth.*, 1952, 35: 1611.

In an unusual family history, 6 cases of bilateral retinoblastoma were encountered in a sibship of 9 infants. The parents were white, poor, ignorant share-crop farmers. Four of the 6 affected children were brought into the Cincinnati General Hospital on court order. The diagnosis was confirmed by the pathological examination of eleven enucleated eyes. Three of 6 siblings who had bilateral enucleation from 15 to 33 months after birth did not survive. The surviving 3 children are in institutions for the blind where they are progressing well. The third, fourth, and seventh of the children were unaffected.

The article is profusely illustrated with 10 cuts. Sovik's observations support the theory that retinoblastomas originate from the outer nuclear layer, although Duke-Elder thinks that the point of origin is more frequently the inner nuclear layer. In one of the cases it appears that the orbital tissue of the second eye became involved by intracranial extension.

JAMES E. LEBENSOHN, M.D.

EAR

Selection of Patients for Surgical Procedures in Chronic Suppurative Otitis Media. KINSEY M. SIMONTON. *J. Am. M. Ass.*, 1952, 150: 461.

During the past 15 years there has been a marked decrease in the number of patients who have required surgical procedures for the treatment of inflammatory disease of the temporal bone. This decrease is the result of the profound influence that treatment with the sulfonamide and antibiotic drugs has exerted on acute inflammation of the middle ear and mastoid. The result of decrease in the incidence and destructive effect of acute infection is seen in lessening of the incidence of chronic inflammation in these regions. There remains, however, a considerable reservoir of patients who suffer from the effects of chronic suppuration of the ear that had its inception in the preantibiotic era. In addition, there are patients who currently undergo chronic inflammation of the ear as a result either of infection by resistant strains of micro-organisms or of inadequate treatment of acute infections.

The predominant factors in the production of chronic inflammatory disease of the middle ear and mastoid are destruction of tissue and the presence of stratified squamous epithelium in an abnormal location. The exception is the occasional patient with chronic inflammation in the cells of the mastoid.

Acute bacterial infection of tissue usually is found only as a temporary complication of the chronic process. For this reason, chemotherapy or antibiotic therapy offers little aid except as an adjunct to established procedures for cleansing, exposing, and draining the involved area.

The possible variations that may be encountered in cases of chronic suppurative otitis media are infinite. A classification of these cases is of tremendous value when it indicates the nature and extent of the pathologic process and suggests those measures that are appropriate for its treatment. The author, therefore, reiterates a simple, empirical classification of cases of chronic suppurative otitis media that has proved its value during the 30 years that it has been used at the Mayo Clinic.

In this classification, all cases of chronic suppuration of the middle ear and mastoid are divided into four groups, designated by numbers 1 to 4.

Group 1 comprises those patients with mucoid discharge that arises in the eustachian tube. There is no odor. The drainage may be continuous or there may be long periods of freedom from discharge. Exacerbations or recurrences usually result from acute

infections of the upper part of the respiratory tract. The perforation in the tympanic membrane may be of any size or location, but is usually found in the anteroinferior quadrant. The tympanic mucosa presents a normal appearance in those patients in whom it can be seen. There is no evidence of cholesteatoma or of hyperplastic change suggesting necrosis of the bone. Roentgenograms may show moderate sclerosis of the mastoid process. Treatment is directed toward healing the eustachian tube and the elimination of abnormalities in the nose and nasopharynx. After secretions have been removed from the ear by suction through a fine cannula, liquid medication is forced through the eustachian tube from the ear.

Group 2 includes patients who show evidence of disease in the middle ear in addition to the findings in group 1 patients. The discharge is mucoid or purulent and may have considerable odor, owing to the action of saprophytic bacteria. Polyps are often present; they may arise from the promontory of the cochlea, the annulus tympanicus, or the attic. There may be necrosis of the ossicles. Roentgenographic findings are similar to those encountered in patients in group 1. The odor of the secretion usually disappears after a day or two of treatment. Treatment is similar to that administered to patients in group 1. Complete cleansing of the middle ear is of paramount importance and should be done daily. Polyps should be removed if they cause retention of secretions.

Group 3 includes patients with a definite defect into the attic. Small perforations are more significant than large ones. The discharge is purulent and fetid. Granulations are frequently found. Desquamated epithelium may be found by probing or by irrigation. Loss of hearing of the stapes-fixation type is common. The roentgenographic findings are similar to those found in patients in group 1 or 2. Sometimes a small area of decreased density may be found in a sclerotic mastoid. The patients included in group 3 usually present borderline surgical conditions. Failure to attain relief from the symptoms after a reasonable trial of conservative therapy is indication for surgical intervention.

Group 4 comprises those patients in whom there is definite indication for early operation. The objective findings are similar to those encountered in patients in group 3. Discharge is purulent, fetid, and persistent, but may be small in quantity. In addition, there is definite clinical or roentgenographic evidence of cholesteatoma. Polyps may be particularly prominent. When the patient displays evidence of labyrinthine, intracranial, or septic complications he is immediately classified in group 4. These complications are denoted by a history of vertigo, headache, pain, convulsions, stupor, nausea and vomiting, facial palsy or septic fever, and evidence of increased intracranial pressure or a fistula into the labyrinth. Treatment in these cases is surgical.

After the physician has decided which patients must undergo surgical treatment for chronic suppuration of the ear and temporal bone, he must decide what surgical procedure is best suited to the needs of the patient. An attitude of flexibility should be maintained in the choice of surgical procedure, and the selected procedure should be adapted to the anatomic and pathologic findings in the individual patient. Many of the details of the procedure will be dictated by the findings after exposure of the field of operation. The complete article contains a discussion of the broad aspects of surgical treatment and outlines the general rules for treatment of various conditions and complications that are associated with otic suppuration.

Nonchromaffin Paraganglioma (Glomus Jugulare Tumor) **of the Middle Ear.** JAMES A. CLEARY. *Arch. Otolar.*, Chic., 1952, 56: 378.

Sixty-one cases of nonchromaffin paragangliomas (glomus jugulare tumors of the middle ear) have been presented in the literature. The tumors have been recognized only a relatively short time, but are now being uncovered more frequently.

The first symptom may occur at any age but the average age is about 43 years. The disease is more frequent in females. There is a definite familial tendency.

Subjective symptoms are nonspecific and in common with inflammatory conditions of the middle ear. When the patient is first seen there is likely to be aural discharge, a polypoid mass in the external auditory canal, and even facial paresis. Characteristic and suggestive of the tumor are an extreme tendency for the mass to bleed with the slightest trauma; a subjective sense of pounding noise and pulsation (synchronous with the pulse); progressive expansile growth; and, generally, long duration of symptoms, frequently associated with recurrences of polypoid masses in the external canal following repeated removals. The progression of the lesion has been divided into four stages: tinnitus, impaired hearing, and bulging and redness of the eardrum; tumor mass in the external canal, which bleeds easily; cranial nerve palsies, especially the seventh through the twelfth nerves; and pressure on the brain.

When a mass presents in the external canal, the diagnosis is easily made by biopsy. If the drum is intact it is necessary to do a myringotomy and obtain the biopsy. X-ray studies of the skull may contribute to the diagnosis.

Surgical extirpation is the best form of treatment. Bleeding may be a major handicap during the operation. Deep x-ray therapy is not effective, except as palliation.

Metastases are rare but have been reported. Spread and destruction by continuity, however, may cause demanding symptoms. Recurrences should be dealt with immediately.

A case of nonchromaffin paraganglioma of the middle ear is presented. The patient had been operated on 10 years previously because of a "granuloma" in the external auditory canal but the operation was terminated before completion because of excessive bleeding. This suggests that the tumor

had been present that length of time without symptoms. At final surgery, an empyema and a cholesteatoma were found in addition to the vascular tumor. The tumor had a macroscopic connection with the jugular bulb. JOHN R. LINDSAY, M.D.

Developmental Anomalies of the Sound Conducting Apparatus and Their Surgical Correction. GEORGE E. SHAMBAUGH, JR. *Ann. Otol. Rhinol.*, 1952, 61: 873.

Developmental anomalies of the sound-conducting apparatus are not common but are important to the patient because of the hearing impairment from birth which, if bilateral, may interfere with the normal development of speech. Cosmetic considerations often focus attention on the unilateral cases when an external deformity accompanies the anomaly of the sound-conducting system. Until recently a pessimistic attitude was taken toward surgical correction of these problems.

Congenital anomalies resulting from developmental failure vary considerably, according to the point of developmental arrest. To understand the possible anomalies that may be encountered, and the surgical skill needed to deal with them, a clear understanding of the embryological development of the ear is essential. A statement of the salient features in the embryological development of the ear is included in the article. To both the patient's and the surgeon's advantage is the fact that the two principal divisions of the ear arise from different embryologic anlages, and there is a marked tendency for anomalies of the inner ear to be independent of anomalies of the middle and outer ear. In the author's series of 22 ears with developmental anomalies of the sound conducting apparatus, 18 had normal cochlear function, 2 certainly had a cochlear defect, and 3 a probable cochlear defect.

The most common defect in the series reported, and also according to the literature, is the failure of the ectodermal cord to canalize. The pinna may be absent, microtic, or normal. The external auditory meatus may be absent, or consist of a shallow, funnel-shaped depression. Beyond this lies an irregular mass of fibrous tissue, cartilage, and bone, with a bony plate at the site of the tympanic membrane. The malleus and the incus may be normal or deformed, but the stapes is usually normal.

Less commonly there is a partial canalization of the ectodermal cord with a formed tympanic membrane but with an atresia between the inner end of the meatus and the primary meatus. Occasionally the anomaly is chiefly deformity and fixation of the stapes. This last condition can be confused with otosclerosis, but can be differentiated because the deafness has existed since birth, the hearing loss is not progressive, and there is no family history of otosclerosis. A congenital anomaly of the other ear may suggest the possibility of an anomaly of the stapes.

Surgical correction is indicated in all bilateral cases of congenital atresia unless there is a profound cochlear defect. Patients with unilateral involvement may be benefited enough to justify surgery, both from the cosmetic point of view and from that of hearing improvement permitting better localization of sound. The optimum age for the correction of bilateral cases is as young as adequate cochlear function can be determined. This is probably not before the age of four. In unilateral cases there is less urgency and operation can be delayed even until adulthood.

No one surgical technique is suitable for all cases. The aim in all cases is to construct a sound-conducting apparatus most nearly approaching the normal mechanism. The most favorable cases are those with an intact tympanic membrane and a mobile ossicular chain beyond the atresia. Establishing a patent meatus may give hearing that approaches or attains normal.

Where there is no tympanic membrane, but there are normally formed and mobile ossicles, a skin graft is placed against the malleus and incus as a substitute tympanic membrane. Cicatrization following this procedure may fix the ossicles and require their removal at a second operation. If the stapes becomes fixed by subsequent scarring fenestration of the horizontal semicircular canal is indicated. If there is a congenital fixation of the stapes fenestration is indicated at the first operation. The author does not believe in routine fenestration of the semicircular canal, as has been advocated by another investigator; consensus of opinion supports this view.

The endaural approach is the safest and most direct for the correction of these anomalies. There are many anatomical variations that pose extremely complicated surgical problems that severely tax surgical ability and ingenuity. Exposure of the area is difficult, and tissue filling the area of the normal osseus meatus must be carefully removed to determine whether an intact tympanic membrane exists. If so, a new osseus meatus is created without opening the attic, and this meatus is lined with skin grafts. In many cases the head of the mandible lies against the mastoid process and the middle ear must then be entered through the attic. An aberrant facial nerve is commonly encountered. The anomaly sometimes includes a much reduced or absent antrum, attic, and tympanic cavity. These defects make the atticotomy approach, as used in fenestration surgery, the most successful. If an attic cannot be located it is better to terminate the surgery than risk adding a facial paralysis to the already existing congenital deformity. If the attic and middle can be exposed the type and extent of the anomaly can be determined and the appropriate corrective procedure selected.

The author includes a table listing data concerning the 22 ears in his present series. The overall results postoperatively are excellent as regards hearing improvement. The author's results seem to justify his optimism concerning this field of temporal bone surgery.

The surgical problems that may present themselves in the course of attempted correction of these

anomalies require a surgeon of wide experience in temporal bone surgery, and one possessing better than average skill, ingenuity, and courage.

FLETCHER AUSTIN, M.D.

New Theory for the Correlation of the Pathology and the Symptomatology of Ménière's Disease. A Research Study of the Vestibular Endolymphatic Labyrinth. J. LEMPERT, D. WOLFF, J. H. T. RAMBO, E. G. WEVER, and M. LAWRENCE. *Ann. Otol. Rhinol.*, 1952, 61: 717.

A new theory on the etiology of Ménière's disease is presented, based on histologic observations of pathologic changes found in the membranous external semicircular canals, including the ampullae and part of the utricles, which were removed surgically from 6 consecutive patients who were suffering from repeated severe paroxysmal attacks of Ménière's disease.

Hallpike and Cairns first reported distention of the cochlear duct and absence of the normal soft perisaccular connective tissue surrounding the saccus endolymphaticus as the most significant pathologic post-mortem findings within the labyrinths of 2 patients whose eighth nerve had been sectioned for the relief of Ménière's syndrome. These findings have since been confirmed by other investigators, and Ménière's disease is now predominantly referred to as endolymphatic hydrops. It has been more or less generally accepted that the symptomatology of Ménière's disease is caused either by a hypersecretion or by poor resorption of endolymph.

The authors, although confirming this finding of cochlear duct distention, have been unable to accept the increased pressure of endolymph as the cause for the symptomatology. No concrete histologic evidence can be demonstrated that the hydrops within the cochlear duct actually represents either a hypersecretion of endolymph, or an impeded resorption of normally secreted endolymph, or a combination of both. A number of other points are mentioned that do not seem to fit in with this theory as the cause of the symptoms of the disease. Important among these is the failure to explain how increased endolymphatic pressure within the cochlear duct and saccule only can cause the severe vertigo, or why the vertigo appears in paroxysms. Neither do the authors believe that the hearing loss is adequately explained, and they cite that destruction of the cochlear duct surgically sometimes fails to relieve the vertigo.

These inconsistencies between Ménière's syndrome and the histopathology to which these symptoms are attributed suggested to the authors that Ménière's disease may be primarily a disease of the vestibular labyrinth and that the cochlear disease and symptoms are the sequelae of the vestibular disease. Because of this view, they made an extensive histological study of the vestibular membranous labyrinths removed in vivo during the performance of a partial labyrinthectomy for the arrest of vertigo in Ménière's disease. In 6 consecutive patients the membranous external semicircular canal, including the ampulla, was removed with the least possible trauma. Part of the utricle was pulled along with four of these canals. These were immediately fixed and then sectioned for study. Macula from 4 patients and a crista from 2 patients were observed. All showed marked degenerative changes of a chronic type. These included changes in the hair cells and nerve fibers, and cystic degeneration with pigmentation. Study of the membranous walls of the 6 external semicircular canals showed the inner lining of all to be studded with vesiculated epithelial excrescences. These varied in size and number and suggested the formation of epithelial fluid collections. By another study these changes were ruled out as having been produced by surgical trauma.

These epithelial changes in the membranous semicircular canals had been described in 1938 by Hallpike, and again in 1943 by Altmann and Fowler, Jr., but no pathologic significance had been attached to the finding.

The authors could not accept this vesiculation as being without significance, and in order to determine its significance they extended the scope of their investigation of the inner lining of the membranous labyrinths. Here they found that normally the membranous canal bears an inner lining of delicate squamous-type epithelial cells of hexagonal shape. These cover those areas of the inner canal wall not occupied by specialized sensory epithelium. In the normal regions the nuclei of these cells produce the acellular collagenous substance which comprises the thickness of the membranous semicircular canal wall In the abnormal vesiculated areas this production of collagenous substance follows an abnormal pattern and the substance is extruded toward the lumen of the canal instead of away from the lumen. These globules now bulge into the lumen of the canal, burst, and pour their contents into the lumen of the canal. The authors accept this vesiculation as pathologic and from this premise construct their theory for correlating the pathology and symptomatology of Ménière's disease.

It is believed that Ménière's disease is a chronic, progressive, herpetic neuritis of the vestibular labyrinth of either toxic or trophic origin, that the attack of the symptom complex is due to rupture of one or more of the epithelial vesicles with release of a toxic fluid into the lumen of the membranous labyrinth, that the size and number of the vesicles rupturing at one time determines the severity of the attack, and the paroxysmal nature of the disease is due to the continued formation and periodic rupture of these vesicles.

All the symptoms of Ménière's disease can be explained as being the result of contamination of the endolymph by this vesicular fluid. The vertigo is due to hyperexcitability of the crista by the contaminated endolymph, and not to increase in the fluid pressure. The distention is the result of excess pressure from the vesiculation and toxic fluid production. The cumulative loss of hearing during the

course of the disease is due to progressive damage to the organ of Corti by the repeated contamination of the endolymph. The tinnitus is the result of stimulation of the organ of Corti by the contaminated endolymph. The deafness that occurs with the attack represents a toxic loss of function in the hair cells of the organ of Corti. The symptoms of the attack subside slowly because the contaminated endolymph is slowly resorbed.

FLETCHER AUSTIN, M.D.

PHARYNX

Combined Cervicobuccal Partial Pharyngectomy for Cancer of the Oropharynx. RONALD W. RAVEN. *Brit. J. Surg.*, 1952, 39: 503.

An operation is described for cancer of the lateral wall of the oropharynx which involved the tonsil, the fauces, the soft palate, and the base of the tongue. Metastases also were present in the upper deep cervical lymph nodes. The author states that this was the first time such an operation had been performed successfully.

The type of case for which the surgery was devised was not suitable for irradiation nor for destruction of the lesion by diathermy coagulation. Because of these considerations it was decided to perform a radical operation which conformed to the principle of cancer surgery, i.e., the primary disease must be widely excised together with the lymphatic vessels and the regional lymph nodes in continuity. The operation as performed was a combined cervicobuccal partial pharyngectomy and radical lymphatic block dissection of the neck, left side, and reconstruction of the oropharynx.

The induction of anesthesia was carried out with sodium pentothal given intravenously and followed by cyclopropane administered by the endotracheal route. The hypopharynx was packed off with gauze to prevent the entrance of blood in the larynx.

The operation was done in two stages, the cervical and the buccal. The cervical stage was done first. The incision commenced on the side of the lesion at the tip of the mastoid process and curved forward below the angle of the mandible to the midline 1 inch below the symphysis menti. It then passed down the midline to within ½ inch of the suprasternal notch, and outward above the clavicle to the posterior border of the sternomastoid muscle.

The posterior flap was reflected off the platysma and was lifted as far back as the anterior border of the trapezius muscle. The upper flap was reflected upward to expose the outer aspect of the mandible and the lower part of the parotid gland.

A standard block dissection of the neck was now carried out to remove the platysma muscle and the deep cervical fascia from the midline to the anterior border of the trapezius, the sternomastoid, omohyoid, posterior belly of the digastric, and sternohyoid muscles, the internal jugular vein, upper and lower groups of the deep cervical nodes, and the retropharyngeal nodes.

The oropharynx was mobilized laterally and posteriorally by removing the posterior belly of the digastric stylohyoid, and stylopharyngeus muscles. The carotid sheath was identified and the carotid arteries were retracted laterally. The hypoglossal, glossopharyngeal, and facial nerves were preserved. The ascending pharyngeal artery was ligated and divided. The oropharynx was freed from the inner aspect of the mandible and separated from the prevertebral fascia and muscles posteriorally as high as a point well above the upper border of the carcinoma. The fibers of the superior constrictor muscle of the pharynx which arise from the pterygoid plate were divided.

The mouth was now widely opened by a gag and an incision was made around the carcinoma at least 1 inch distant from its edge with the diathermy knife. This incision was deepened through all the structures of the pharyngeal wall. The growth was then delivered into the cervical wound and the carcinoma was removed in continuity with its lymphatics, the retropharyngeal, upper, and lower deep cervical lymph nodes.

The pharynx was closed by suture of the muscles of the pharynx with interrupted sutures of silk, and reinforced by the use of fibromuscular tissue in the vicinity. In order to shut off the lateral compartment of the neck from mouth contamination a portion of the upper border of the posterior skin flap was fixed to the prevertebral fascia on the posterolateral aspect of the pharynx by several interrupted silk sutures. The rest of the upper border was sutured to the margin of the upper skin flap over the mandible. This formed a small gap, lined with skin, through which drainage from the pharynx could occur if there was any leakage. The remainder of the wound in the neck was closed with interrupted sutures with drainage from the lowest aspect of the wound.

A number 12 esophageal tube was passed into the stomach. Feeding was done through the tube for 1 week and then fluids were given by mouth. The feeding was increased gradually through the semisolid food stage until normal food could be taken. Systemic penicillin was continued for 4 days postoperatively. Early ambulation was instituted.

This operation was performed on the first patient in July of 1949. The patient made an uninterrupted recovery and is alive and well 2½ years after the operation. Since the article was written another patient with a similar carcinoma has successfully undergone the procedure and is well 5 months later.

FLETCHER AUSTIN, M.D.

NECK

Clinical Evaluation of Tracheotomy in Respiratory Complications of Poliomyelitis. HERBERT H. HARRIS. *Arch. Otolar.*, Chic., 1952, 56: 385.

A review of the literature reveals unmistakable evidence that death from poliomyelitis in a great percentage of the cases is due to pulmonary anoxia

as a result of ventilative failure. This may be due to respiratory center paralysis, paralysis of the primary muscles of respiration, obstruction of the larynx due to paralysis or aspiration of secretions, and pulmonary edema. The pulmonary complications of atelectasis, bronchopneumonia, and marked congestion of the lungs have been the common findings.

Recent studies in several instances of respiratory complications reveal that there has been a great reduction in the mortality rate because of early tracheotomy to the point of prophylaxis in many patients.

A study of the author's own cases shows a rather high respiratory case fatality rate of 35 per cent in 1950, due in part to a number of late moribund patients received at the center and also to the performance of tracheotomy at the critical time which was usually too late. The patients in 1951, up to the time of this writing, were treated somewhat differently. The same indications were kept in mind, but tracheotomy was resorted to because of anticipated complications in severe cases. This procedure decreased the bulbar and respiratory case fatality rate to 10 per cent.

Conclusions based on this small series of cases would not be enough in themselves, but together with the cases in Table 1 in the original article they constitute favorable evidence.

Pulmonary complications and anoxia can be minimized by assurance of a free airway by tracheotomy performed before the patient is compromised.

Once pulmonary complications have developed, the value of tracheotomy decreases, especially if marked cyanosis has occurred and especially if a respirator is required. Bronchoscopy is effective in chronic cases with atelectasis, but it does not give the assurance of a continued free airway in the acute cases.

Tracheotomy in simple bulbar poliomyelitis is definitely indicated for patients with adductor paralysis of the vocal cords, especially those with difficulty in swallowing or those showing marked listlessness or coma. Patients with severe difficulty in swallowing were materially helped by the tracheotomy tube during the re-education period of swallowing. Aspiration frequently took place, and suction could easily be carried out.

Tracheotomy for bulbospinal patients with respiratory paralysis requiring a respirator is most important, and it is believed that recovery is in direct proportion to the number of tracheotomies done. Tracheotomy must be done very early.

For spinal patients with respiratory paralysis requiring a respirator, tracheotomy is most valuable when done early in a selected few cases because of failure to co-ordinate the swallowing mechanism with the phases of the respirator or because of coma due to any cause.

A review of the literature shows a few complications as the result of tracheotomy. Very few complications are believed to be due to direct breathing into the trachea. In this series there were no complications attributable to tracheotomy.

W. FOSTER MONTGOMERY, M.D.

Symptomatic Laryngocele in Cancer of the Larynx.
PIERO MEDA. *Arch. Otolar.*, Chic., 1952, 56: 504.

Formerly considered a rarity, the association of a laryngocele with carcinoma of the larynx has been found more frequently because of roentgenologic examination of the larynx. A laryngocele results from a dilatation of the appendix of the ventricle of Morgagni. It may bulge into the lumen of the larynx, thus forming an internal laryngocele, or it may extend outward through the thyrohyoid membrane, forming an external laryngocele. A laryngocele develops in patients with carcinoma of the larynx due to the presence of edema or infiltration at the neck of the appendix resulting in a valvelike stenosis which allows the entrance but not the exit of air. Demonstration of a laryngocele can be obtained by roentgenologic examination made in the lateral projection of the larynx with the common technique and with stratigraphic technique in the frontal plane.

The author reports on 6 patients with carcinoma arising in the laryngeal vestibule or the region of the ventricle, and associated with laryngocele. In the first 4 cases, the laryngocele could not be demonstrated by laryngoscopic examination but was shown roentgenographically. The importance of roentgenologic examination of the larynx is emphasized. When laryngoceles are demonstrated, a tumor of the ventricle can be expected. ROBERT A. WISE, M.D.

SURGERY OF THE NERVOUS SYSTEM

BRAIN AND ITS COVERINGS; CRANIAL NERVES

Surgical Clinic on Hydrocephalus. AGUSTIN BACHS and A. EARL WALKER. *Surg. Clin. N. America*, 1952, 32: 1347.

Non-neoplastic hydrocephalus only is discussed. In about one-third of the authors' patients, the condition occurred within the first 2 years of life, as a result of birth trauma; in one-third of the cases there were malformations, of which aqueductal stenosis or atresia was the most common type; in one-sixth of the cases, hydrocephalus developed from infection. From the third to the fifteenth year of life birth trauma does not seem to be as significant a causal factor as it is in infancy, whereas infection and malformations are very important factors.

Various short-circuiting operations have developed in the surgical treatment of obstructive hydrocephalus. Ventriculoperitoneostomy (in a patient with atresia of the sylvian aqueduct) was first reported by Kausch in 1905. Cone now obtains good results with the use of a flexible rubber tube. In children, of course, the tube must be replaced as growth occurs. Third-ventriculostomy was described by Dandy in 1922. If the optic nerve was short it had to be sacrificed. Mixter introduced a ventriculoscope through the lateral ventricle in order to perforate the lamina terminalis. About one-third of Dandy's third-ventriculostomies sealed over and closed. Ventriculocisternostomy, devised by Torkildsen in 1939, short-circuits fluid by means of a rubber catheter from the posterior horn of the lateral ventricle to the cisterna magna. In cases of obstruction of the third ventricle, it is believed that Torkildsen's procedure is probably the treatment of choice. In cases of obstruction of the aqueduct of Sylvius, Dandy suggested that the canal might be recanalized by gently dilating with a probe and then leaving a catheter in place. The possibility of damage to periaqueductal structures makes this a very hazardous procedure. Hyndman devised a method by which communication of the lateral ventricle with the cisterna ambiens could be effected. In 1950, Nosik reported a method of draining the ventricular fluid to the antrum of the mastoid; meningitis developed in as high as 50 per cent of his patients on whom ventriculomastoidostomy was performed. Other reports give similar percentages. Matson has recently popularized Heile's arachnoidoureterostomy, and has had some excellent results.

The treatment of nonobstructive hydrocephalus has been attacked with the idea of either decreasing the amount of spinal fluid produced or allowing adequate drainage of that produced. Choroid plexotomy was first attempted with a coagulating cystoscope by Lespinasse, in 1910. Subsequently many authors including Dandy, Sachs, Putnam, and Scarff have reported encouraging results. Arachnoidoperitoneostomy, introduced by Ferguson in 1898, was tried by Cushing, and is now used without much success. Arachnoidoureterostomy was described by Heile in 1925. The high incidence of meningeal infection and unexplained deaths, now known to be due to electrolyte imbalance, prevented its early popularity. Antibiotics and the daily ingestion of 1 to 6 gm. of salt daily has allowed Matson to reintroduce the procedure, and report amazingly good results. In 1950, Ziemnowicz suggested that the subarachnoid fluid might be channeled to the cavernous body of a vertebra for absorption there.

A follow-up of 283 patients treated at the Johns Hopkins Hospital by various techniques, but mainly plexotomy and third ventriculostomy, was made by letter. The plight of these hydrocephalic patients, salvaged by surgery, is a sorry one at 5 years after operation. By far the majority have died and only 10 per cent of the original group are capable of a normal life; another 10 per cent are still "existing," for the most part in special institutions for feebleminded or crippled children.

Certain types of hydrocephalus (unfortunately, not very common) do seem to respond to surgical therapy. Hydrocephalus due to aqueductal block, congenital atresia of the foramina of Luschka and Magendie, and Arnold-Chiari malformation may be relieved in the majority of cases. Such cases should not be missed; nor should the possibility of a subdural hematoma as the cause of cephalic enlargement be forgotten, for it may be cured.

DAVID G. FREEMAN, M.D.

Brain Abscess Due to Cladosporium Trichoides: Report of the Second Case Due to This Organism. ARTHUR B. KING and THOMAS S. COLLETTE. *Bull. Johns Hopkins Hosp.*, 1952, 91: 298.

This case report is worthy of note because it is the second case of brain abscess due to the fungus Cladosporium trichoides reported in the medical literature.

The case history is of a 47 year old white laborer who had had a purulent drainage from his left ear before the onset of neurologic signs. On admission to the hospital, examination revealed signs that were indicative of a left frontal lobe tumor, and this was verified by appropriate studies. A craniotomy was performed and an encapsulated abscess was completely removed. The patient made an uneventful recovery and was discharged from the hospital in 2 weeks. Three weeks later the patient was readmitted to the hospital because of convulsions and, despite further surgery, he had a rapid down-hill course and demise.

Autopsy was performed and revealed several daughter abscesses which were essentially unen-

capsulated. The actual source of the abscess could not be located, and although the fungus organism was also cultured from the petrous bone, it was believed that this may have been due to contamination at the time of the postmortem examination. The organism was studied and classified by Emmons of the National Microbiological Institute in Bethesda, Maryland. JACK I. WOOLF, M.D.

SPINAL CORD AND ITS COVERINGS

En Passant Injury of the Spinal Cord. MALCOLM B. CARPENTER. *U. S. Armed Forces M. J.*, 1952, 3: 1441.

The author believes that the use of the term "spinal cord concussion," particularly in regard to war injuries, does not specify any definite characteristics of the condition. It is suggested that in injuries near the spinal cord but in which the spinal cord is indirectly injured the term "en passant" injury be used. Certainly the term "spinal cord concussion" lacks the specificity of the term "cerebral concussion."

The impairment of neural function is believed to be a consequence of the absorption of energy resulting in the equivalent of an internal explosion of tissue. The author had the opportunity of studying 5 cases of such indirect neural damage. There was a varying degree of neurologic signs, some patients showing complete recovery, whereas others were left with spasticity, evidence of disturbances of the posterior columns, and spinothalamic tracts, and with nerve root involvement. Four of the patients had a definite hypotonia and affected musculature, and 1 patient had a marked spasticity. The Lhermitte sign was present in 2 patients, and was thought to imply an intrinsic lesion of the spinal cord.

Such signs, of course, imply that there was greater damage than we understand from use of the term "spinal cord concussion." These myelopathies are believed to be the result of tremendous amounts of energy absorbed and transmitted to the spinal cord from projectiles in their course through non-neural structures. JACK I. WOOLF, M.D.

PERIPHERAL NERVES

Nerve Compression by Simple Ganglia. DONAL M. BROOKS. *J. Bone Surg.*, 1952, 34-B: 391.

The author described 13 cases of ganglia of the joint region associated with local nerve compression. Four cases involved the ulnar nerve at the elbow, 3 cases the ulnar nerve at the wrist, 1 case the median nerve at the wrist, 3 cases the lateral popliteal nerve below the knee, and 2 cases the digital nerves at the ankle. All of the cases responded favorably to surgical excision although a second excision was required in 2 cases because of recurrence. The symptomatology consisted of pain in 8 cases; weakness or numbness and tingling were the most common symptoms in the other cases.

In cases in which the ganglion was found to be connected with the joint, the stalk was cauterized. When the ganglion is firmly attached to, or has penetrated, the nerve sheath, instead of merely compressing it, the author recommends puncture of the ganglion rather than excision. This may involve the possibility of recurrence but avoids injury to the nerve fibers. GEORGE M. AUSTIN, M.D.

Solitary Tumors of Peripheral Nerve Trunks. S. A. JENKINS. *J. Bone Surg.*, 1952, 34-B: 401.

There are four swellings which occur on the nerve trunks; traumatic neuroma, neurofibroma, neurilemmoma, and neurofibrosarcoma. The author discusses only the two benign tumors of this group, namely, neurilemmoma and neurofibroma. In this article he has presented 3 cases of surgical removal and pathological verification of solitary tumors of the peripheral nerve trunks. He carefully introduces his own preferred term of "neurilemmoma" by going into the background of its origin. It is agreed that there are tumors of nerve sheaths, but, on the basis of the large amount of collagen and reticulin found between the cells, Penfield, Mallory, and Tarlov prefer the term "perineurial fibroblastoma." This term was preferred because Schwann cells are derived from ectoderm and therefore are theoretically incapable of forming the collagen and reticulin fibers found between the tumor cells. The other viewpoint is based on the theory that these tumors are derived from the sheath cells of Schwann and that these cells are also responsible for the production of the collagen and reticulin fibers. Mason, Stout, Nageotte, and Willis thus prefer the term "schwannoma" or "neurilemmoma."

The author's 3 cases involved the radial, peroneal, and ulnar nerve, respectively, and all responded well to surgical removal of the tumor, with the return of function.

It is logically concluded from this article that a solitary tumor of a main peripheral nerve trunk which is not diffuse (neurofibroma), but circumscribed, with fibers passing to one side or spread out over the surface, and which does not appear malignant, is probably a "neurilemmoma." In addition, if this tumor appears cystic, is encapsulated, and shows no thickening of the nerve trunk beyond the tumor mass, it is not likely to be a neurofibroma, but a "neurilemmoma." Finally, if on histologic examination the tumor cells are arranged in palisade formation and/or in whorls, with intervening bands of collagen or reticulin fibers, then the tumor is probably a "neurilemmoma" and may or may not contain areas presenting myxomatous cystic degeneration.

The precise importance of the differential diagnosis lies in the fact that only the neurofibromas become malignant and, therefore, only in cases of these tumors is wide excision of the tissue necessary.

GEORGE M. AUSTIN, M.D.

SURGERY OF THE THORAX

CHEST WALL AND BREAST

Surgical Correction of Funnel Chest. F. Gordon King. *Ann. Surg.*, 1952, 136: 798.

Funnel chest is a congenital and developmental condition in which surgical treatment may be particularly gratifying both to the patient and to the family. Although this condition has numerous pseudonyms, in this country "funnel chest" and "pectus excavatum" will probably continue to be the terms most widely understood. The true incidence is about 0.59 per cent. The condition may be simulated by congenital rickets, by congenital absence of ribs and cartilages, or absence of the pectoral muscles. True funnel chest is characterized by a relatively symmetrical oblong conical depression of the lower costal cartilages and ribs with a backward displacement of the xiphisternum toward the lower thoracic vertebral bodies. The posterior displacement of the sternal body begins at the manubriosternal synchondrosis. The manubrium is not displaced. The xiphisternum and lower end of the sternum may be pushed backward until near, or in actual contact with, the bodies of the vertebrae. The deformity, usually apparent at birth, becomes progressively more noticeable as the child grows.

In addition to the striking deformity of the chest, certain other body characteristics are usually present. The hollow-chested appearance is augmented by unusually rounded and stooped shoulders, and by the fact that the vertebral column is flexed forward, giving an exaggerated dorsal curve. In infants and very young children the tendency for the chest to flex on the abdomen is such that, even with coaching, the patient often seems to be unable to correct this flexed posture. The vertical diameter of the chest is usually increased, with both leaves of the diaphragm occupying a relatively low position. The heart is often displaced, usually to the left. Lester directed attention to a paradoxic respiration in the younger patients. This is especially noticeable during crying spells when, with attempts to expand the thoracic cage, the lower portion of the sternum moves inward.

As a result of the writings of Ochsner and DeBakey, Brown, Lester, Sweet, and Ravitch during recent years, 6 cases in which operation was successfully performed are reported in this article. In the series there were 5 boys and 1 girl. The ages were 8 months, 10 months, 1½ years, 5 years, 10 years, and 16 years. The deformity was present in all patients at birth, but in the 2 oldest children the deformity was not considered noticeable until they were about 9 years of age. The parents and the patients believed that the deformity became rapidly progressive as early symptoms of puberty developed.

All of the patients gave a definite history of frequent and severe acute infections of the upper part of the respiratory tract, a level of energy lower than that of comparable associates. Other symptoms complained of included an "irritative" type of cough during sleep, vague anterior or substernal pain in the chest, shortness of breath on moderate exertion, and a discontinuance of activity because of unwell feelings within the chest. The older children were aware of the deformity and were unhappy in regard thereto. The indications for surgery are several. A pediatrician of long and extensive experience directed attention to the fact that in the children with a funnel chest whom he had observed, there had never developed a robust physique, and he observed that they were shorter in stature than others of their age. Other physicians have indicated that there is a tendency for the development of a pronounced inferiority in their personality. An increased incidence of infections of the upper respiratory tract, chronic bronchitis, asthma, and tuberculosis seems well established. If the heart is not displaced laterally, it may be subjected to definite compression with embarrassment of function. There is skeletal deformity, resulting in rounding of the shoulders and kyphosis. There is marked psychic trauma due to the cosmetic nature of the deformity and a limitation in the social and athletic activities of adolescent children. In the child, the progressing deformity is in a reversible state.

Brown, Ochsner, and DeBakey, Lester, and Ravitch have directed attention to a substernal ligament which they believe is responsible for the abnormal anatomy. It is a ligamentous continuation of the linea alba which passes upward along the posterior surface of the rectus abdominis muscles, the xiphoid process, and the sternum. Over-development of the substernal ligament explains flexion of the chest on the abdomen. Lester believes that obstruction of the upper part of the respiratory tract, as caused by over-development of tonsil and adenoid tissue, is a contributing etiological factor, and that it may lead to poor results or recurrence following surgical treatment. Sweet believes that the deformity is primarily skeletal, and concluded that the substernal ligament did not seem important in his cases.

In only 1 of the author's cases was it possible to demonstrate a substernal ligament, in spite of every effort and care to do so.

In the younger patients, simple resection of a short substernal ligament, perhaps a transverse incision in the central tendon of the diaphragm closed anteroposteriorly to increase this length, probably resection of the lower costal cartilages, or a combination of all three procedures, may be indicated. In the adult type, correction must depend upon more extensive plastic measures. The author believes that all costal cartilages which retain the sternum in its backward displaced position must be resected, any ligamentous attachments at the lower end of the

sternum or xiphoid process must be released, and a manubriosternal osteotomy must be accomplished to allow anterior displacement of the sternum. Wire sutures in the periosteum and fibrous tissue at the site of the osteotomy usually suffice to maintain anterior displacement of the sternum. The author has made no effort to suture the cartilage ends to the sternal margins. The cartilage has been removed, leaving as much perichondrium as possible, and it has not seemed necessary to remove any excess.

Complications have been primarily in the form of pneumothorax. In 2 cases rather severe tension pneumothorax developed before the mechanism was understood and the urgency of a leak-proof closure of the skin was realized. In the course of cartilage resection, it is almost impossible to escape perforation of the pleura, but with positive-pressure intratracheal anesthesia, the lungs can be well expanded just before final closure. The small residual pneumothorax is readily corrected by simple needle aspiration. Hemorrhage from the internal mammary arteries may be brisk, but if it is anticipated control is not difficult. Transfusion has been carried out in all but 2 instances. Infection has not occurred. One patient, the oldest, had a moderate hemothorax. Sternal traction maintained by means of a Jacob's ladder was removed with sutures on the tenth day, and the patients left the hospital about the fourteenth day after operation.

The results in all cases were excellent, and there were no serious complications, residual conditions, nor mortality. The period of observation covered 2 to 4 years, and there is no indication that recurrence is likely.

In 1 case of the series, scoliosis was remarkably improved coincidentally with correction of the funnel chest deformity.

Three additional patients were treated surgically following the preparation of this article. There were no complications and the results are apparently good. BEATTY H. RAMSAY, M.D.

Lesions of the Thoracic Parietes in Infants and Children: Deformities and Tumors of the Chest Wall; Abnormalities of the Diaphragm. M. M. RAVITCH and J. C. HANDELSMAN. *Surg. Clin. N. America*, 1952, 32: 1397.

The authors give a concise review of the thoracic parietal problems encountered in children, with a discussion of the diagnosis, treatment, and prognosis.

The first portion deals with the lesions of the chest wall, the most important being that of pectus excavatum, due to its more common occurrence.

Pectus excavatum can occur as a mild depression of the body of the sternum or a major depression causing compression of the heart or displacement of the heart to the left. There is always a flat-chested appearance with decreased anteroposterior diameter and concomitant upper thoracic kyphoses. The lesion when marked in the newborn or very young usually progresses in severity and may cause definite decrease in pulmonary reserve associated with exercise, and in some instances may be associated with cardiac arrythmias. Several cases to illustrate this are presented. Some patients develop the progressing deformity in the adolescent years rather than in childhood. Paradoxical respiratory movements in the affected area is a common finding. In all patients, male and female, there is a definite cosmetic problem with associated psychological embarrassment.

The prescribed repair consists of subperichondrial excision of all deformed costal cartilages, coupled with section of the xiphosternal joint and transverse wedge osteotomy of the body of the sternum just above the uppermost limits of the depressed portion with suture fixation of the osteotomy site in the corrected position. The intercostal bundles are then approximated in the midline beneath the sternum or are fixed at its margins. There seems to be little tendency for the depression to recur and the cosmetic improvement is almost immediate.

Because of the small size of the structures and their plasticity in the very young, and the ability of the very young to accept this repair without ill effect, the author believes that there is much to be gained and little to be lost by proceeding at an early date with the cases which eventually will need correction.

The split or bifid sternum without associated massive ectopia cordis also lends itself better to early repair due to the plasticity of the tissues. The milder ectopias are amenable to early treatment, although the massive cases offer little hope for survival.

There is a short discussion on absent ribs and pigeon breasts in this section.

Several representative chest wall tumors are discussed, including ganglioneuromas, neurofibromas, neuroblastomas, and chondrosarcomas. Any of these tumors may be obvious at birth and in the case of the neuroblastomas may show metastatic extension at birth. The authors believe that any chest wall tumor in the very young child, particularly when bony destruction of the ribs has taken place, must be considered malignant and treated by radical surgery.

Several cases are presented in which massive resections of the chest wall had to be undertaken to remove an extensive tumor, and a large thoracic defect was left. It is advised that the diaphragm in this instance be freed from its lower attachment and reattached to the chest wall above the defect. This maneuver makes the postoperative recovery much more benign.

In the third portion of the article the author deals with the diaphragmatic defects, reviews the embryology and the diagnosis of diaphragmatic hernia.

Early operation, after adequate diagnostic studies have been done, fluid balance has been secured, and intestinal tube decompression has been started, is again advised.

The author prefers to reduce and repair the major defects, particularly on the left side, through a subcostal approach, although in all cases an intercostal

catheter with suction is inserted for postoperative management. However, he prefers to repair the esophageal hiatus hernias through a transthoracic approach with section of the diaphragm if gastric fixation is needed.

The "true eventrations" with the congenitally high diaphragm are discussed with regard to plications of the diaphragm as the treatment of choice.

A selected review of the literature is appended.

JOSEPH A. CONROY, M.D.

Diagnosis and Treatment of Certain Forms of Chronic Cystic Mastitis (Breast Dysplasia). MURRAY M. COPELAND. *Am. Surgeon*, 1952, 18: 992.

Breast dysplasia is associated with endocrine imbalance and as such is neither inflammatory nor neoplastic. Prior to puberty or the advent of the corpus luteum, lobule formation does not appear in the normal female breast. In the premenstruum, progesterone together with estrogen is involved in the growth of the mammary lobule, the degree of growth depending upon the quantitative intensity of hormonal stimulation. Alveolar formation in the lobule is dependent upon the luteal hormone of the placenta and the mammogenic hormone. Secretion in turn is dependent upon the intactness of the hypophysis and the effectiveness of the anterior pituitary hormone.

Mastodynia is a form of dysplasia that is characterized by pain and tenderness of the breast during the premenstruum. The pain is localized in the outer and upper third of the breast and is either unilateral or bilateral. It occurs more frequently in married women between the ages of 20 and 40. Mastodynia occurs in two endocrine types: the woman with a tendency to sterility, and the young woman with atrophic breasts. A lump or swelling is usually palpated over the area of pain. The swelling varies in size but grows smaller after menstruation. Pain may radiate to the arm or shoulder. On histologic examination, the involved area may be found to contain numerous small cysts, imperfect lobulation, with increased periductal and intralobular stroma. The lining cells of the tubules may show reduplication. Some mammary lobules may be completely obliterated by fibrosis.

The treatment of mastodynia is nonspecific. Empirically, 10,000 international units of estrogen may be administered once a week between two menstrual periods, followed by injections of 2,000 units once a month in the premenstruum for a short time. Progesterone in oil, up to 80 mgm., administered during one or two menstrual cycles appears also to be effective.

Adenosis, or Schimmelbusch's disease, is observed in women between the ages of 35 and 44. It is recognized by the presence of multiple nodules distributed along the upper and outer hemispheres of the breast. It occurs commonly in childless women who have a tendency to menstruate irregularly. This condition is usually superimposed on a severe mastodynia. Bleeding occurs in 4 per cent of these cases. The disease process is characterized microscopically by minute adenomas, intracystic papillomas, and cystic degenerations. The epithelium is hyperplastic with proliferation into the surrounding stroma. Adenosis involves patients of two endocrine groups: women of early sexual maturity, or women 30 years of age or over showing breast changes due to hyperestrogenism and lowered function of the corpus luteum. The incidence of carcinoma in adenosis is 4 per cent.

Proper treatment requires investigation of all doubtful nodules. Amputation of the breast as a prophylaxis against carcinoma is not indicated. Estrogen therapy should not be given because of the already existent hyperestrogenism. Cystic nodulations may be aspirated. Symptomatic relief can be obtained by the intramuscular injection of progesterone in oil administered during the last 2 weeks of two or three menstrual cycles. During and after pregnancy or lactation adenosis may disappear.

Cystic disease of the breast is commonly found in women between the ages of 41 and 45. The cysts are 1 cm. or greater in diameter and are located in the breast parenchyma. The solitary cyst is the most common benign lesion of the breast during the cancer age period. It predominates in childless women in a 3:2 ratio. This disease is believed to be due to unopposed estrogen stimulation. Monocystic disease is associated primarily with the discovery of a lump in the breast which is noted to fluctuate in size. In 11 per cent of the cases single cysts are found in both breasts. In 25 per cent of the cases multiple cysts are found in one or both breasts. The tendency to multiplicity and bilateral involvement is suggestive of an endocrine dysfunction. These cysts transilluminate well. The cysts are blue-domed in appearance on operative exposure and are usually embedded in dense parenchyma. Microscopically the lobules appear small with irregular areas undergoing dilatation or regression. The epithelium of some acinous structures may simulate sweat gland epithelium.

In 7 per cent of cases spontaneous regression is noted. In 15 per cent, the cysts redevelop after primary excision. In about 1 per cent of cases carcinoma of the breast may develop. These cysts usually refill after aspiration. The solitary cyst is best treated by excision. Amputation of the breast does not prevent the occurrence of cysts in the remaining breast.

B. G. P. SHAFIROFF, M.D.

Paget's Disease of the Nipple. N. JOHNSON. *Austral. N. Zealand J. Surg.*, 1952, 22: 111.

Paget's disease of the nipple presents in the majority of cases as a red, raw granular nipple lesion. In some cases it is eczematous or dry and scaling. It should be suspected in any nipple lesion which persists for more than 3 to 4 weeks. Paget first described the condition in 1874 and showed its intimate association with the occurrence of mammary carcinoma.

There has been a prolonged controversy as to the site of origin of Paget's disease of the nipple. The characteristic "Paget" cells are also of indeterminate origin, some authors believing they are epidermal, arising solely from the epithelium of the nipple. Others think that they arise in the epithelium of the ducts of the breast and migrate to the epithelium of the nipple.

The author analyzes 20 cases; in 75 per cent of these there was an associated carcinoma of the breast on the first examination. Lymph node metastases were present in 7 of the 20 cases. The best results occurred in the cases in which superficial changes were noted. The author does not state his opinion as to the origin of the "Paget" cells, but believes that treatment for Paget's disease of the nipple should be the same as that for other mammary carcinoma even if no tumor is clinically palpable. HAROLD M. UNGER, M.D.

Mammaplasty. HERBERT CONWAY. *Plastic and Reconstr. Surg.*, 1952, 10: 303.

Conway reports his experience with 110 consecutive cases in which mammaplasty was done for micromastia, macromastia, or mastoptosis. The operations were performed during the years from 1936 to 1951. Follow-up information was obtained by examination and questioning of the patient 1 year or more after the operation in 72 cases and from written questionnaires in 38 cases. The operation was done for bilateral macromastia in 88 cases, unilateral macromastia in 2 cases, bilateral mammary ptosis in 9 cases, unilateral congenital micromastia in 2 cases, unilateral micromastia secondary to the excision of a tumor in 1 case, postoperative unilateral micromastia secondary to mammaplasty in 2 cases, postoperative asymmetry of the breasts with excessive scar in 4 cases, and for deformity of the breast secondary to burn scar in 2 cases.

A conservative attitude has always been advocated with regard to the indications for mammaplasty. Only those patients were approved for operation in whom excessive size and weight of the breasts represented a true physical and mental handicap, those in whom asymmetry of the breasts represented significant deformity, those in whom previous mammaplasty had caused serious deformity, and those in whom improved mammary contour was of importance to their commercial activity. Pain in the breasts was not a significant symptom in these patients.

Various techniques of transposition of the mammary gland were applied in 22 cases of macromastia, with major complications in 6 cases and satisfactory results in only 12 cases. Sixty-eight patients with macromastia were treated by partial breast amputation with free composite nipple grafts. With this technique there were no major complications.

The nipple grafts were completely successful in 65 cases. Transplanted nipples regained sensation and erectility. The result of operation was satisfactory in all cases. Eight patients who became pregnant following free transplantation of the nipples exhibited no complications as a result of this technique of mammaplasty for macromastia.

STEPHEN A. ZIEMAN, M.D.

TRACHEA, LUNGS, AND PLEURA

The Repair of Tracheal Defects with Fascia and Tantalum Mesh: An Experimental Study. EDWARD A. SWIFT, JOHN H. GRINDLAY, and O. THERON CLAGETT. *J. Thorac. Surg.*, 1952, 24: 482.

Defects, varying in size, were produced experimentally in the intrathoracic portion of the trachea of dogs. These defects were then repaired in several ways. "Window" defects, varying in size from 1 by 1 cm. to 2 by 2.5 cm., and including 2 to 4 rings were closed with fascia, with fascia and cartilage (either ground costal cartilage or long narrow strips of the same material), with fascia and tantalum mesh, and with tantalum mesh over a temporarily placed indwelling prosthesis of polyethylene. Tubular defects were produced in 6 animals by removing a whole tubular segment of the trachea. In 2 animals this defect was repaired simply with tantalum mesh over the temporary prosthesis; in the 4 others a sheet of autogenous fascia was first wrapped around the tube-filled defect and then the tantalum was applied and secured to the upper and lower tracheal ends. The tubes were subsequently withdrawn at intervals of 1 to 7 months.

In the 16 animals in which the defects had been repaired with fascia alone, the fascia appeared to have survived and was quite well covered with ciliated epithelium. In the 11 animals which had the additional support of cartilage, the cartilage survived moderately well when applied in the form of slender strips. In several instances in which ground cartilage was used, gross bits of cartilage were seen 2, 3, and 4 months after operation, incorporated in a fibrous network. In the 10 animals in which tantalum was utilized, this inert material produced no reaction and was well tolerated. However, rough points or irregularities in the surface of the metal produced erosion of the overlying fascia and prevented complete epithelization of the inner surface of the repair. It was apparent that certain requirements must be met in using this metal: (1) the edges must be carefully folded to eliminate sharp ends; (2) the mesh must be placed outside of the fascial graft; (3) large enough pieces must be used to permit lapping them over the trachea at least 1 cm. on each edge; and (4) the mesh must be carefully molded to the shape of the trachea. In the last 2 groups of dogs, 12 in all, in which tantalum mesh was applied over a temporary indwelling tube, with or without autogenous fascia for a lining to the mesh segment, tracheal stenosis of significant degree developed after removal of the tubes. Regeneration of the epithelium was incomplete and did not proceed rapidly enough to alter the stenosis. Whether the mesh was lined with fascia seemed to make little difference.

BENJAMIN F. LOUNSBURY, M.D.

Resection in Pulmonary Tuberculosis. WINFIELD O. KELLEY and DAVID V. PECORA. *J. Thorac. Surg.*, 1952, 24: 510.

The authors present an analysis of 107 consecutive pulmonary resections performed on 101 patients at the Connecticut State Tuberculosis Sanatorium, Norwich, Connecticut, between October, 1948 and July, 1951. Six patients were subjected to bilateral resections.

The first patients were invariably desperate risks and a high percentage of the earlier resections were pneumonectomies, which procedure was carried out on 36 of the 101 patients. Thirty-four simple lobectomies and 11 lobectomies combined with either segmental or wedge resections were performed. The remaining 26 patients had either segmental or wedge excisions. Indications for resection were limited at first to conditions such as bronchostenosis, tuberculous bronchiectasis, tuberculoma, lower lobe cavity and, in particular, thoracoplasty failure. Indications for resection were gradually extended to include such problems as destroyed lung with or without empyema, thick-walled or giant cavities, suspected carcinoma, and, most often, the preservation of respiratory function.

Resection was not performed until lesions in the portion of the lung to be conserved were regressive or stable. Operation was not denied any patient who might benefit from it. In several instances of bilateral far-advanced disease with cavitation, only the cavitary diseased portion was excised, and grossly involved lung was left behind. Nevertheless, these patients have done surprisingly well and almost all have negative sputum. Every patient in this series received either streptomycin or dihydrostreptomycin for at least a few days prior to operation and 1 month after the last operative procedure. Para-aminosalicylic acid was added in the latter part of 1949.

Since the lateral decubitus position, employed in the first 27 resections, was followed by three operative spreads of the disease, the prone position was substituted, and in 80 resections no spread was encountered. Usually the amount of lung tissue to be resected was determined by palpation, and segmental or wedge resections were employed to preserve a maximum of functional tissue. When, however, tuberculous bronchostenosis or bronchiectasis was known to be present, the involved portions of the lung were removed, regardless of their gross appearance. Fifty-three postresection thoracoplasties were added, after each pneumonectomy and after 17 subtotal resections in which the remaining lung tissue would not fill the hemithorax. Ventilatory studies on 41 patients showed that resection of more than four segments decreased the maximum breathing capacity below the preoperative level. Resections of lesser magnitude improved the breathing capacity. Partial resection and thoracoplasty produced little change, whereas pneumonectomy and thoracoplasty resulted in the greatest loss of respiratory function.

Tuberculous complications occurred in 18 patients following operation. Of 8 patients with bronchopleural fistulas, 6 were subjected to thoracoplasty and were cured; the other 2 developed empyema. Three instances of postoperative spread, 3 of reactivation, and 4 of bronchial stump ulceration (bronchostenosis present preoperatively) responded readily to streptomycin therapy. Prolonged intermittent preoperative antibiotic therapy seemed to exert a deleterious rather than a beneficial effect after operation, but this point is far from being settled. While thoracoplasty proved to be curative for bronchopleural fistula in every instance in which it was employed, it did not appear to be helpful in other tuberculous complications. Thirteen patients developed nontuberculous complications, but all responded favorably with appropriate treatment.

Three deaths occurred in the entire series, an operative mortality of 2.8 per cent and a case mortality of 3 per cent. Of 98 surviving patients, information on 6 is insufficient to permit an accurate appraisal of their present status, 10 have positive sputum and/or roentgenograms, and 82 have stable roentgenograms and negative sputum.

Although unequivocal conclusions cannot be drawn until the lapse of many more years, the authors' experience seems to indicate that resection is not only safe but is a highly effective procedure in the management of many forms of pulmonary tuberculosis. The earlier results compare favorably with those of thoracoplasty, and ventilatory function is not as compromised as it is after the latter procedure.

DAVID H. LYNN, M.D.

Congenital Esophagobronchial Fistula in an Adult. JACOB K. BERMAN, PASQUALE S. TEST, and BRUCE A. MCART. *J. Thorac. Surg.*, 1952, 24: 493.

Respiratory-esophageal fistulas in the newborn are seldom compatible with longevity unless corrected surgically. Thus, while fistulas between the ventilating and alimentary passages are encountered even more often in adult life than at birth, adult communications are invariably acquired. They may be occasioned by such etiologic factors as neoplasms, infections, trauma, foreign bodies, and esophageal diverticulitis. At times, however, the provocative mechanism is not clear and the defect is called a "spontaneous" fistula. Perhaps some of these represent congenital fistulas, although only rarely do respiratory-esophageal fistulas prove to be unequivocally congenital in origin when encountered in adults. In fact, the authors were able to find only 4 reported cases of congenital fistula in adults. They present in detail an additional case.

The patient, a negro woman, 40 years of age, was first seen by the authors on December 6, 1951 following an episode of severe hemoptysis. She complained of an almost constant productive cough, chills, fever, loss of weight, anorexia, and extreme weakness. She was obviously very ill, dyspneic, emaciated, cyanotic and incoherent. Her fingers were clubbed and she was mentally retarded.

Her past history was long and complicated and information was difficult to obtain. Her symptoms had apparently begun in infancy with bouts of coughing and strangulation after feeding, some of the feeding being coughed up on occasion. Extreme dyspnea limited her childhood activities. She had been in and out of hospitals with recurring attacks of pneumonia, and in 1937, after a severe and prolonged attack, two ribs were resected. Following this her cough became more productive of purulent material and undigested food particles and hemoptysis increased in frequency. Extensive studies in 1941 revealed multiple abscesses of the left lower lobe and severe bronchiectasis. Lobectomy was contemplated but had to be deferred because of a massive hemorrhage. During the subsequent years she was rehospitalized on several occasions but refused to undergo operation.

Physical examination during the present admission revealed the entire left lung to be dull, and a to-and-fro murmur was heard best over the fourth interspace to the left. Bronchoscopic examination showed a stenosis of the left lower-lobe bronchus, and bronchography revealed multiple abscesses in the left lower lobe and advanced bronchiectasis. The basic mechanism underlying the disease was suspected when some of the lipiodol which had been injected into the bronchial tree was visualized in the stomach. Roentgenoscopy demonstrated that part of a barium swallow found its way very easily into the left bronchial tree. Studies employing a barium meal eliminated the possibility that the pulmonary disease might be due to regurgitation and aspiration from such disturbances as a pharyngoesophageal diverticulum or cardiospasm.

On March 1, 1952 the fistula, communicating between the esophagus and the basal bronchus of the left lower lobe, was identified through an extrapleural approach. It was excised and the ends were closed. The operation was interrupted at this stage because the patient's condition had deteriorated. Microscopy revealed the well defined tubular anomaly to be a congenital esophagobronchial fistula.

Eighteen days later surgery was again undertaken. During exposure of the pulmonary artery a patent ductus arteriosus was encountered and divided, the aortic end being closed with a continuous everting suture of fine silk. Further dissection of the hilar structures revealed a second artery arising from the aorta and extending to the basal branch of the pulmonary artery. This anomalous artery was located adjacent to the fistulous tract. It was ligated and divided and removal of the lung was carried out. The patient's recovery was uneventful and she was discharged 12 days later.

Although the exact cause of congenital fistulas between the respiratory and digestive tubes is not clear, many theories have been proposed to explain the embryogenesis of this anomaly. Among these is the suggestion that aberrant vessels may play a prominent role in preventing complete separation of the trachea and esophagus. This concept has not gained wide acclaim and perhaps warrants a greater interest than has been accorded it in the past.

DAVID H. LYNN, M.D.

Occupational and Personal Factors in the Etiology of Carcinoma of the Lung. R. B. MCCONNELL, K. C. T. GORDON, and THELWALL JONES. *Lancet*, Lond., 1952, 263: 651.

The authors are of the opinion that the increase in incidence of cancer of the lungs is real and cannot be accounted for solely by improved diagnostic methods and a greater awareness of the disease among doctors.

The published work on the cause of cancer of the lung is reviewed. An investigation was made and reported of the environmental, occupational, and smoking history of 100 patients with proved cancer of the lung, living in the Liverpool area, and of 200 patients who were suffering with diseases other than cancer.

Careful questioning showed that 47 per cent of the cancer patients had been exposed appreciably to various dusts, fumes, and smokes; 43 per cent of the controls had been similarly exposed.

No significant difference was found in the incidence of smoking in the two groups. A significantly higher proportion (33%) of the smokers with cancer smoked more than 20 cigarettes per day than had the smokers without cancer (18.1%). There was a slightly higher proportion of pipe-smokers among the smokers with cancer than among the smokers without cancer.

It is possible that heavy smoking of cigarettes may be a factor in the etiology of carcinoma of the lung.

W. FOSTER MONTGOMERY, M.D.

HEART AND PERICARDIUM

Congenital Interatrial Communications: Clinical and Surgical Considerations with a Description of a New Surgical Technique: Atrioseptopexy. C. P. BAILEY, D. G. DOWNING, G. D. GECKELER, W. LIKOFF, and Others. *Ann. Int. M.*, 1952, 37: 888.

Consideration of the problem of atrial septal defects, with a discussion of possible treatment, is given in this paper, which represents one of the best reviews of the subject to date.

Embryologically the septal defects result either from failure of formation of the septum primum, or the septum secundum, or from failure of fusion of these two, producing patent foramen ovale. Any combination of these defects may take place, from complete absence of a septum to the smallest patent foramen ovale. This course of events occurs between the fourth and seventh weeks of fetal life.

The uncomplicated atrial septal defects produce predominately a left to right shunt of blood, depending on the size of the opening. The complicated types with associated valvular stenosis and chamber malformations, either congenital or rheumatic, will produce a directional shunt depending on the hydro dynamics of the particular malformation.

The increased filling of the right atrium and ventricle in the left to right shunts necessarily increases pulmonary blood flow. There is subsequent dilatation and hypertrophy of the right atrium, ventricle, and the pulmonary tree in turn. There is no impetus for the left side of the heart to dilate, so it remains of normal size. Pulmonary hypertension is seen in approximately 40 per cent of the cases, and in all of the symptomatic uncomplicated cases, and must be presumed, in the light of present knowledge, to be secondary to the increased pulmonary flow. Atrial pressure on the right side in times of stress and pulmonary infections may increase over that on the left, causing a right to left shunt with cyanosis, or at least decreased oxygen saturation in the peripheral blood.

There are no accurate figures on the occurrence of atrial septal defects in the general population, but in all series females predominate.

Diagnosis cannot accurately be made by physical examination alone, but, in addition, electrocardiography, fluoroscopy, and cardiac catheterization are necessary.

Shortness of breath is the most common symptom, although the patient may be so accustomed to limited exercise tolerance as to be unaware of it. Paroxysmal tachycardia, and hemoptysis as a result of pulmonary hypertension are not uncommon. Chest pain was present in about 10 per cent of the patients operated upon. Rheumatic endocarditis may change the uncomplicated case to a complicated one, especially if severe mitral stenosis supervenes.

The authors believe that the presence of the lesion decreases the normal life span of the individual, although some patients die at an old age, of unassociated disorders.

A review of the various procedures attempted in the repair of these defects is presented, with criticisms of each.

The authors present a new procedure which, it is believed, answers most of the criteria for adequate repair—ease of execution, without increased burden on an already overburdened atrial myocardium. Through a right anterior thoracotomy, a finger is introduced into the right auricular appendage and the defect is palpated. Careful examination is made to make certain that the pulmonary veins empty into the left atrium and that the mitral value is not diseased. If mitral stenosis exists, a finger commissurotomy can be performed with the examining finger. A small invagination in the wall of the right atrium is then pressed into the septal defect and held there with a blunt instrument. With the use of a curved needle, which passes through the external wall of the atrium, through the rim of the septal defect, and out again through the atrial wall, the invaginated portion of atrium is sutured securely all the way around the periphery of the defect, the needle being guided internally by the indwelling finger. After complete closure is obtained by this method, the finger is removed and the appendage is repaired with silk sutures.

One case is presented in which repair, as described, was accomplished with comparative ease. Postoperatively there were attendant pulmonary complications with excessive tenacious secretions and segmental atalectasis, all of which subsided. Three months after operation the patient was asymptomatic, had no murmur, and showed decrease in size of the cardia. At the time of publication of the present article, 6 patients had been operated upon, with 2 deaths of patients with very advanced disease.

This new operation, termed atrioseptopexy, is a decided contribution in the field of cardiac surgery and is a further step toward the eventual solution of many problems outstanding in the surgical repair of cardiac lesions. JOSEPH A. CONROY, M.D.

Surgical Closure of Defects of the Interauricular Septum by Use of an Atrial Well. ROBERT E. GROSS, ALFRED A. POMERANZ, ELTON WATKINS, JR., and EDWARD I. GOLDSMITH. *N. England J. M.*, 1952, 247: 455.

This is an experimental study of a new approach to closure of interauricular septal defects. The authors describe a method of direct access to the septum through the right auricle by the use of a "well" attached to the atrium. This well is allowed to fill with blood and is of sufficient height to allow filling equal to the venous pressure without overflow.

The well is constructed of rubber. It is sewn to the atrial wall. The atrium is opened and the well is allowed to fill. Subsequently, digital exploration and manipulation of materials to close the defects may be accomplished.

A series of 114 dogs were used to test the rubber well. At this time defects were made in the septal wall, which were later closed. From this study it was concluded that (1) the manipulation of the auricle and septum caused no serious cardiac irregularity, (2) the blood rose from 4 to 8 cm. above the lateral surface of the auricle, (3) there was no change in the pulse rate, and (4) there was no aspiration of air into the auricle.

Digital exploration became quite accurate, and one or two fingers could be introduced. After removal of the well the opening was closed with figure-of-eight silk sutures. Six methods of closure were used, but in general three were found applicable for most of the defects. If the defect had a margin of tissue around it, a Hufnagel button was satisfactory. Almost any sized defect could be closed with plastic sheets anchored by means of silk sutures. Defects of 1.0 cm. or less could be closed by direct suture of the edges.

A series of 6 patients were operated on. A "well" was constructed; it was 15 cm. in height and had an atrial orifice of 4 cm. There was no difficulty in attaching the well to the atrium in any case. In the first 3 cases a Hufnagel button was used and the result in each case was a fatality due to migration of the button. The fourth case had a defect 4 cm. in diameter which was closed with

sheet plastic. This case ended in failure because of encroachment of the plastic on the tricuspid valve and the development of a thrombus at the valve. The fifth case presented a defect, 2 by 3 cm., which was closed with a piece of nylon tailored to size and sutured into position. This case was followed up for 2 months; a good result was obtained. The last case had two defects (1 by 1.5 cm. and 1 by 3.5 cm.) which were closed by direct suture. A 2 months' follow-up in this case revealed a satisfactory result, with absence of the cardiac murmur.

On the basis of these experiences the authors warn against using too large a piece of plastic which might occlude the natural orifices in the atrial wall.

R. L. LAWTON, M.D.

Revascularization of the Heart. Observations on the Circulation Following Arterialization of the Coronary Sinus. RICHARD S. HAHN, MAURICE KIM, and CLAUDE S. BECK. *Am. Heart J.*, 1952, 44: 772.

During the past 6 years a full-time investigation was carried out in the Laboratory of Cardiovascular Research, Western Reserve University and the University Hospitals, Cleveland, Ohio, in an attempt to provide the heart muscle with an additional supply of red blood. The method used was the placement of a free graft of jugular vein between the aorta and coronary sinus. For this method to be successful, it was found that the operation must be done as a two-stage procedure. The first stage consisted in placement of the graft. The second stage was done several weeks after the first and consisted in partial ligation of the coronary sinus at its ostium in the right auricle so that all of the blood did not escape into the auricle. Following this two-stage operation it was possible to ligate the descending ramus of the left coronary artery at its origin in one step, with a reduction in mortality and a reduction in destruction of the heart muscle as compared to the mortality and infarction in normal unprotected hearts. It was also possible to ligate this artery without the usual electrocardiographic changes that are found in a normal unprotected heart. Complete ligation of the descending ramus, circumflex ramus, and right coronary arteries was accomplished, with recovery of dogs and with only slight damage to the myocardium. Only the septal branch of the left coronary artery was patent in these experiments.

In order to explain this reduction in both mortality and infarction, the assumption was made that blood flowed from the aorta through the graft into the coronary sinus and its tributaries. It was assumed that from these veins aortic blood traversed the capillary bed where oxygen exchange was possible; however, to some persons interested in this development, this protection did not seem to be adequate proof that this blood did traverse the capillary bed.

More recent experimental studies have yielded evidence which indicates that blood can flow from the aorta, through a graft, into the coronary sinus and its tributaries. From the venous side of the circulation this blood can traverse the capillary bed and emerge from the arterial side of the circulation. In its transit through the capillary bed this blood gives up its oxygen. This retrograde circulation through the capillary bed can explain the benefit that the two-stage operation gives to the heart in the presence of coronary artery occlusion. Some of the specimens show communications between arteries and veins and between veins and arteries without the interposition of a capillary bed.

ROBERT TURELL, M.D.

Surgical Treatment of Mitral Stenosis. ORMAND C. JULIAN, WILLIAM S. DYE, JR., LYLE A. BAKER, and MAX S. SADOVE. *Arch. Surg.*, 1952, 65: 621.

A short history of surgical manipulation of the mitral valve is presented, and two methods of attack, finger-fracture and/or valvulotomy, are introduced. The natural history of the disease is discussed, and an attempt is made to correlate clinical data with actual anatomic changes. This leads to classification of the cases as follows: stage 1, the presence of murmur of mitral stenosis; stage 2, the presence of dyspnea because of myocardial weakness; stage 3, pulmonary hypertension, pulmonary edema with cough, occasional sputum which may be bloody, and associated attacks of right heart failure; stage 4, right heart failure manifested by increased venous and intrahepatic pressure. At present, the stage at which treatment is most effective is stage 3; however, many patients with mitral stenosis, stage 4, have been subjected to operation with good results. In this latter group the liver should be evaluated; also the pulmonary circuit, for the degree of pulmonary hypertension and concomitant arteriosclerosis.

One contraindication is an associated valvular lesion such as aortic stenosis, or a significant degree of mitral regurgitation. Since one cannot be certain as to the type of anatomic lesion present, the patient should be operated upon, and the degree of calcification and amount of regurgitation should be estimated.

Preoperatively, treatment is directed at improving the myocardium. Most of the patients are digitalized, placed on a low salt diet, and given mercurial diuretics. The presence of pericardial effusion does not contraindicate surgery. Premedication was accomplished with meperidine hydrochloride, barbiturates, and atropine. Anesthesia was induced with pentothal and curare; the patients were intubated and anesthesia was maintained with nitrous oxide and ether. At operation it was noted that the pathological findings infrequently correlated with the clinical disease. Of the 42 patients operated upon, 9 were in stage 2, 24 were in stage 3, and 9 were in stage 4. Finger fracture was used in 16 cases, commissurotomy in 19, and a combination of these procedures in 5 cases. Sixteen patients with chronic auricular fibrillation were operated upon. Postoperatively, fluids were limited to a minimum. Occasionally an acute episode of rheumatic fever occurs fol-

lowing operation. In one such instance treatment with cortisone was started on the fourth postoperative day, with no untoward effects. In 3 cases, embolism in a peripheral artery was treated with anticoagulants. One death was attributed to pericardial effusion which was located posteriorly. Three other deaths occurred in poor risk patients.

The operative results in 6 of 8 patients in stage 2 were classed as excellent, with a return to near normal activity and freedom from symptoms. Fourteen of 24 patients in stage 3 were so classified, as were 2 out of 10 patients in stage 4. Moderate improvement (increase in exercise tolerance without symptoms) was noted in 1 patient in stage 2, 6 patients in stage 3, and 4 patients in stage 4.

RICHARD L. LAWTON, M.D.

ESOPHAGUS AND MEDIASTINUM

Consideration and Treatment of Achalasia of the Esophagus. HELGE B. WULFF and ARNE MALM. *Acta chir. scand.*, 1952, 103: 445.

The etiology, clinical symptoms, and some diagnostic characteristics of achalasia are described. The most common operative methods and technique are discussed on the basis of clinical and experimental experience.

Cardioplasty ad modum Marwedel-Wendel is satisfactory as far as the elimination of the cardiac obstruction is concerned, but it is often followed by complications in the form of peptic esophagitis and peptic ulcers, which can in turn cause grave hemorrhagic anemia. This is because the operation renders the cardiac sphincter incompetent. Normally this sphincter prevents the regurgitation of acid gastric juice up into the esophagus. This disadvantage can be avoided by the use of Heller's method which, judging by clinical experience, does not interfere with the function of the cardiac sphincter. In the beginning the authors found Heller's operation less satisfactory but later, when they made the incision longer, the results obtained were good.

They now usually prefer Heller's operation and in the presence of hypersecretion of the gastric juice they extend the intervention to include bilateral vagotomy. JOHN J. MALONEY, M.D.

Diverticulum of Thoracic Esophagus; Two Cases of Special Interest. P. E. A. NYLANDER. *Acta chir. scand.*, 1952, 103: 473.

The author reports 2 cases of esophageal diverticulum which he believes are of unusual interest.

The first case concerns a woman 39 years of age who for 3 years suffered pain in the epigastrium and behind the sternum, and frequently nausea. The pain had increased in severity and was particularly noticeable when the patient lay on her back. There were some symptoms of asthma during this same period, manifested by occasional dyspnea and difficult expiration. Physical examination revealed nothing remarkable, except for whistling rales over the chest. X-ray examination revealed a round, sharply defined diverticulum the size of an orange protruding from the right posterior wall of the lower third of the esophagus.

At surgery on December 9, 1949, through a right thoracotomy incision, a round orange-sized diverticulum was found. The upper surface was approximately 4 cm. caudal to the azygos vein. Mobilization was easy except for a band of connective tissue which arose from the upper surface of the diverticulum and ran medially upwards to join the lower surface of the right main bronchus near the bifurcation. No lymphadenopathy and no scar tissue were present. The opening between the sac and the esophagus measured approximately 1.5 cm. in diameter.

Pathologic examination revealed a soft, elastic structure with an interior surface that was smooth and shiny and which resembled esophageal mucosa. The lumen did not extend to the band of connective tissue described above. Microscopic examination revealed the presence of the same layers as those in the esophagus, and slight signs of inflammation.

Postoperatively, the patient has done very well, and the significant fact is that the symptoms of asthma have disappeared.

The second patient was a woman 37 years of age who was admitted to the hospital with a diagnosis of hiatus hernia. The history was that of pain in the left costal margin for 17 years, which was aggravated on bending forward. Symptoms were progressive and included regurgitation of gastric juice and even of food after meals. Occasionally there was the feeling that solid food stuck in the esophagus.

Physical examination was not remarkable. Roentgenograms of the esophagus revealed that the contrast media passed through the esophagus quickly to the region of the cardia, and there filled a thoracic diverticulum the size of a goose egg. On the whole, the walls of the diverticulum appeared smooth, but the roentgenologist thought he saw at the bottom of the sac a niche-shaped formation with protruding edges, and he suspected an ulcer. The diagnosis, however, was only that of an esophageal diverticulum.

Thoracotomy was carried out through the eighth rib bed on October 4, 1950. At the lower end of the esophagus immediately above the diaphragm a greyish tumor (the size of a goose-egg) rather firm and rough, and covered by thin pleura, was visible. Upon mobilization the tumorlike formation proved, for the most part, to be a diverticular sac with a rather firm walnut-sized nodule in the wall. The opening between the diverticulum and the esophagus was comparatively wide. No other abnormality was noted, but because of the suspicion that a malignant degeneration had occurred in the wall of the diverticulum, the lower esophagus and the diverticulum were resected and the stomach was anastomosed to the proximal stump of the esophagus. The postoperative course was uneventful.

Pathologically, the diverticulum was lined by normal esophageal mucosa. The walnut-sized tumor

within the wall revealed a cut surface that was pale and sharply demarcated and consisted, microscopically, of interlacing muscle fibers. A diagnosis of myoma and esophageal diverticulum was made.

In the discussion, the author theorizes that the asthmatic symptoms in the first patient may have been produced by the filling up of the diverticulum, bringing about an irritation in the respiratory tract. He believes that in cases of asthma of unknown etiology, contrast examination of the esophagus is indicated. BEATTY H. RAMSAY, M.D.

Carcinoma of the Esophagus. LEIF EFSKIND. *Acta chir. scand.*, 1952, 103: 401.

The author reports 44 cases of carcinoma of the esophagus treated by transthoracic resection and esophagogastrostomy. The operative mortality was 18.2 per cent. The observation time is too short to give any reliable conclusion as to the curability. It may be mentioned, however, that of 15 patients treated more than 2 years ago, one-third are alive.
JOHN J. MALONEY, M.D.

Primary Neoplasms and Cysts of the Mediastinum. DAVID C. SABISTON, JR., and H. WILLIAM SCOTT, JR. *Ann. Surg.*, 1952, 136: 777.

The authors have reviewed 101 cases of primary tumors or cysts of the mediastinum. In 90 patients the diagnosis was confirmed at operation, and in 11 patients it was established at autopsy.

The 20 patients who had tumors of neural origin comprised the largest group. In all but one case these tumors originated in the posterior mediastinum and 5 of them were malignant. Fifteen of the 20 lesions occurred in children and young adults. Cough and dyspnea were present in the majority, and only 4 asymptomatic neurogenic tumors were found on routine roentgenologic examination. Two patients in this group suffered from neuroblastoma. One of these was in a boy 6 years of age, with a very large tumor originating in the lower anterior mediastinum and projecting into both right and left hemithoraces. The second neuroblastoma occurred in a man 47 years of age and lay in the posterior mediastinum, from where it invaded the spinal canal with the production of cord compression. Neither of these two tumors could be completely removed. However, references are given which point out that these highly malignant tumors, even when not resectable, are not always fatal. Rarely, the rapidly growing tumor undergoes spontaneous necrosis and disappears, and even more rarely, this malignant lesion may "mature" into a benign ganglioneuroma.

Seventeen of the lesions were cysts: bronchogenic, dermoid, enterogenous, pericardial, and nonspecific. There were 17 tumors of the thymus, 12 of which were benign and 5 malignant. Eight benign neoplasms occurred in patients with myasthenia gravis, and of the malignant thymomas, none were associated with myasthenia gravis. There were 10 patients in whom the lesion proved to be an undifferentiated carcinoma which appeared grossly to give the impression of being primary. In no instance could a primary lesion be demonstrated in the lung or other organ. All such cases were completely investigated clinically or at autopsy. In this regard, mention is made of the series of Heuer and Andrus. In their series, 31 mediastinal carcinomas were shown to have originated in the lung, 12 were metastases from other sites, and 17 were considered to be primary mediastinal tumors. The authors state that carcinoma can develop as a primary mediastinal lesion from the thymus, a dermoid cyst, or a teratoma. Two of the 10 patients in this group had obstruction of the superior vena cava: 4 tumors occurred in the anterior, 4 in the superior, and 2 in the posterior mediastina. There were 9 teratomas in the series, and the authors specifically differentiate these lesions from dermoid cysts. All of the 9 teratomas arose in the anterior mediastinum, and 4 of the 9 were malignant. Six patients in this present survey had primary mediastinal lymphosarcoma: 4 of these tumors arose anteriorly and 2 posteriorly. Reference is made to Schafer and others, who state that the mediastinal nodes are secondary only to the cervical nodes in the frequency with which they are the site of origin of lymphosarcoma. The hilar nodes on one or both sides are commonly involved, with the production of a characteristic radiologic appearance of a mass with a scalloped outer margin located anteriorly and centrally in the mediastinum. In only one of these cases was the tumor sufficiently well localized to permit excision. This patient has survived for 6 years with no evidence of recurrence. Five patients in this series suffered from Hodgkin's disease. Rarely, Hodgkin's disease may make its first clinical appearance in the mediastinum. Usually when the mediastinal nodes are involved, there is coexistent manifestation in the lymphoid tissue elsewhere in the body. In all of the 5 cases reported herein, a mass presented primarily in the anterior mediastinum. There was no clinical evidence of involvement of the lymphatic system elsewhere. The tumor could be grossly removed in one patient. There were 5 cases of intrathoracic thyroid tumors, one of these being malignant. There were 5 poorly differentiated sarcomas: 4 of these were widely invasive and were not resectable; the fifth sarcoma was well encapsulated grossly, and could be removed. Listed also in the series are 2 cases of parathyroid adenoma, 2 cases of lipoma, 1 case of fibroma, 1 case of leiomyoma which arose from the muscular wall of the esophagus, and 1 mesothelioma of the mediastinal pleura.
BEATTY H. RAMSAY, M.D.

MISCELLANEOUS

Thoracic Inlet Neurovascular Interference. CLIFFORD JONES and D. H. RANDALL. *Brit. J. Surg.*, 1952, 40: 128.

The authors consider the various clinical conditions produced by pressure on, or displacement of, the brachial plexus and subclavian artery in the

region of the thoracic inlet, a syndrome similar to that usually ascribed to the presence of a cervical rib.

While there is no doubt that the pain and muscular wasting is due to pressure on the neural structures, the etiology of the vascular symptoms is hotly disputed by two opposing schools of thought —the one view being that the vascular symptoms are due to direct pressure and damage to the subclavian artery, and the other that the symptoms are due to irritation of the sympathetic nerves as they run in the brachial plexus. By this last theory, the ischemic attacks are vasospastic phenomena.

Clinically the patient is more frequently a female and usually between 40 and 50 years of age. Nervous manifestations include pain in the shoulder girdle, usually over the deltoid, the side of the neck, or between the spine and scapula. In addition there may be shooting pains down the forearm. Paresthesias are common in the fingers. Numbness and coldness of the fingers may be seen as well as weakness and muscular wasting.

The vascular effects seen are coldness and pallor, although a persistent dull red color or the occurrence of a Raynaud-like phenomenon is occasionally observed. The subclavian artery may be damaged and ischemia and gangrene of the digits may be seen, but this is probably due to local emboli or thrombosis.

It is suggested that the mechanism of the production of symptoms is a gripping of the brachial plexus in a vise formed by the scalenus anticus in the front, and a firm structure behind, usually a thickening of Sibson's fascia, but possibly cervical rib (bony or fibrous) scalenus medius, or even a normal first rib.

Excessive work with the arm, particularly the movement of abduction and carrying, together with a drop in the thoracic cage, thus stretching and tightening the vice, seems to precipitate the syndrome. It is suggested that the normal scoliosis to the right in right-handed people will accentuate the mechanism producing the syndrome on the left side.

Only a proportion of patients will require surgery —namely, those in whom other measures fail, those with severe symptoms, and those with wasting. When surgery is required, it should consist of careful exploration of the posterior triangle of the neck and division of all possible sources of compression.

Some failures are to be expected, due to causes which are at the moment not clear. Too early return to heavy work should be discouraged.

EDMUND R. DONOGHUE, M.D

Management of War Wounds of the Chest. MAJOR A. R. VALLE. *J. Thorac. Surg.*, 1952, 24: 457.

This article summarizes the experience in dealing with 1,535 chest casualties admitted to the Tokyo Army Hospital, Tokyo, Japan, during the period between the onset of the Korean conflict and January, 1952. Of this total number of patients 66 per cent had penetrating wounds, 32 per cent had perforating wounds, and 2 per cent had crushing injuries of the chest.

Hemothorax was the most frequent problem; there were 952 patients who developed it. Of these, 74 per cent remained sterile, and 26 per cent became infected. The author feels quite strongly that thoracentesis and antibiotics constitute the best early treatment for hemothorax. Decortication for organized hemothorax was required 152 times; there was no mortality in this series of operations. In only 5.5 per cent of these operative cases was the result considered poor enough to return the patient to the Zone of the Interior for further treatment.

There were 104 patients whose intrathoracic foreign bodies required removal. In 31 of these the removal was accomplished at decortication; for 73 others thoracotomy had to be done primarily for the removal of the foreign bodies. All 104 of these patients returned to duty. When these results are compared with those obtained by earlier removal of foreign bodies at forward installations, it is apparent that delayed removal gives better end results.

Lung abscesses were treated by lobectomy or partial lobectomy in 9 patients, all of whom recovered and returned to duty.

The 108 patients who had injuries to the diaphragm, such injuries were repaired at thoracotomy. In thoracoabdominal wounds in which the abdominal involvement was in the upper abdomen the repair was handled satisfactorily through the thoracotomy wound. It is the author's feeling that more extensive abdominal wounds associated with chest wounds should be treated by separate thoracotomies and laparotomies. In the patients whose chest wounds were associated with colostomies, nephrectomies, serious liver infections, and other long term abdominal problems the chest wound was treated by rib resection and open drainage so that the patient could be safely evacuated to the Zone of the Interior. A similarly conservative approach to thoracic wounds was invoked in 197 patients who also had serious nerve injury and in 408 patients with orthopedic injuries requiring prolonged definitive treatment.

It is worth noting that the operative mortality was 0 per cent and the over-all mortality 0.4 per cent.

BENJAMIN F. LOUNSBURY, M.D.

Coarctation of the Aorta. FRANK GLENN and WARD D. O'SULLIVAN. *Ann. Surg.*, 1952, 136: 770.

Surgical treatment of coarctation of the aorta is simple in concept. Its purpose is the removal or circumvention of an obstruction and establishment of an adequate channel for the flow of blood. The procedures available are, first and foremost, resection and direct end-to-end anastomosis of the aorta. If the stenotic segment is long or the adjacent aorta diseased, complete resection may make end-to-end anastomosis impossible. In these cases the inter-

position of an arterial graft is probably the method of choice. By-passing the zone of obstruction by the use of a vessel such as the subclavian is the third operative procedure and should be reserved for those instances in which direct anastomosis or grafting is impractical.

The authors presented an interim report on 21 cases of coarctation of the aorta subjected to operation. Three patients were explored; surgical correction was deemed unwise and no therapeutic procedure was performed. Eighteen had definitive surgery. Seventeen of these had a diaphragmatic obstruction in the aorta and were treated by resection of this obstruction and end-to-end anastomosis. Of these 17 patients, 1 had aortic insufficiency and 1 had an aneurysmal dilatation of the aorta at the sinuses of Valsalva.

A number of anatomical features seen in this group are of interest. Despite the number of huge arterial collaterals in the chest wall, blood loss need not be extreme. The great majority of the larger arterial channels in the chest wall lay in the intermuscular fascia and could be identified and clamped before division. The coarctation was always immediately distal to the ligamentum arteriosum and consisted of a narrow segment of aorta containing a palpable diaphragm. Despite this constant relationship to the ligamentum arteriosum, the stenosis was a varying distance from the origin of the left subclavian artery. In several cases it was at the origin and in 1 case it was 4 cm. from it. A fairly constant finding was a good-sized vein lying transversely over the point of stricture. In all cases, the first pair of intercostals were hugely dilated, at times aneurysmal, as they joined the aortic wall. Below the first pair the intercostals rapidly assumed a more normal size. In several instances a branch arose from the subclavian artery near its origin well in the thorax. When this came off posteriorly it was subject to injury as the subclavian artery was freed, and in 1 case this friable vessel was torn and the subclavian artery had to be ligated to control the bleeding. In 1 young boy the subclavian artery was atretic from its origin up to the internal mammary artery. In no instance was the ligamentum arteriosum patent. In many cases the aorta seemed drawn inward and angulated at the insertion of this structure.

There was 1 death in this series, an over-all mortality rate of 4.8 per cent, or 5.6 per cent of those receiving definitive surgery.

There were no major postoperative complications. The postoperative functional results definitely favor operative therapy.

Although many problems are still unsettled, the authors believe that prolonged delay in operating on individuals with this condition may deprive them of some of the benefits of surgery. Early diagnosis and early treatment, as in other progressive diseases, seem the proper approach to coarctation of the aorta.

ROBERT TURELL, M.D.

SURGERY OF THE ABDOMEN

GASTROINTESTINAL TRACT

Prolapsing Gastric Mucosa: A Review of 117 Cases in a Private Practice. McLAREN JOHNSON. *J. M. Ass., Georgia*, 1952, 41: 439.

One hundred and seventeen case reports of prolapsing gastric mucosa are given in table form with the many signs and symptoms outlined. It is believed that the gastric mucosa prolapses through the pylorus fairly commonly. There is a difference of opinion whether or not the condition requires operation in mild cases. Many of these prolapses can be placed under medical management because an ulcer may be present on the prolapse. Massive hemorrhages have been found to be associated with prolapse of the gastric mucosa through the pylorus. Only 1 case of malignant change has been reported in this condition. The author suggests that if surgery is indicated it should be limited to some form of pyloroplasty. RICHARD J. BENNETT, JR., M.D.

Gastritis and Its Sequelae. JOHN R. ROSS, BELTON G. GRIFFIN, and SARA M. JORDAN. *Gastroenterology*, 1952, 22: 205.

Case records of 538 patients with a diagnosis of gastritis were reviewed. Twelve patients died from malignancy, 6 having been clinically diagnosed as having gastritis. Those with gastritis classified as acute or alcoholic, antral, and atrophic did not subsequently develop malignancy. This study suggests that when a patient has anemia, achlorhydria with or without anemia, and prominent gastric rugae as revealed by x-rays or by means of the gastroscope, and is within the cancer range or age, he should be suspected of harboring a malignancy.

It has been further brought out that in this series of cases the diagnosis of gastritis has been made less frequently in the past 8 years, which suggests that the original diagnoses made years ago were rather overenthusiastic. It is recognized that gastritis, particularly hypertrophic gastritis, has carcinogenic potentiality. RICHARD J. BENNETT, JR., M.D.

Gastric Mucin—A Chemical and Histologic Study Following Bilateral Vagectomy, Gastric Resection, and the Combined Procedure. WALTER L. MERSHEIMER, GEORGE B. JERZY GLASS, FRANCES D. SPEER, JAMES M. WINFIELD, and LINN J. BOYD. *Ann. Surg.*, 1952, 136: 668.

An excellent study of the secretory activity of gastric mucin and its fraction in the human stomach is presented. The investigations included secretory studies in human beings on both main components of the dissolved gastric mucin, for example, mucoproteose and glandular mucoprotein, as well as histochemical studies of the gastric mucosa in dogs.

Twenty-five patients who underwent partial gastrectomy by a modified Hoffmeister technique, 5 patients who underwent a bilateral vagectomy alone, and 5 patients on whom a partial gastrectomy and bilateral vagectomy were performed were studied. The secretory response of free hydrochloric acid and glandular mucoprotein to insulin stimulation was observed. In the normal stomach the glandular mucoprotein is strongly influenced by the vagus nerves and the intact stomach in that its concentration rises sharply after insulin stimulation. There is also a similar rise in the concentration of free hydrochloric acid. This rise of both mucoprotein and free acid is considered a positive pattern of response. After a bilateral vagectomy there is a depression of the secretion of both mucoprotein and free acid under fasting conditions and the response to insulin stimulation is abolished. This is typical of a negative response.

In 25 patients following partial gastrectomy the depression of the free acidity under fasting conditions and the depression or abolition of its normal response to insulin stimulation was demonstrated. However, there was little alteration in the concentration of glandular mucoprotein under fasting conditions and the characteristic response to insulin stimulation was preserved. This loss or decrease in acid response and the retention of mucoprotein response to insulin was termed the dissociated pattern of response.

After partial gastrectomy combined with bilateral vagectomy there is a complete depression of free acid and glandular mucoprotein and the response to insulin is lost. This is considered a negative pattern.

This study of the glandular mucoprotein response to insulin stimulation is of definite value in evaluating the completeness of vagectomy. This was true particularly in cases in which combined vagectomy and partial gastric resection were done, and in which the negative acid response to insulin was obtained. When this occurs the negative acid test may depend not only on the severance of vagi nerves but also (a) on neutralization of the acid by the regurgitated duodenal content and bile, (b) on abolition (by resection of the antrum) of the acid-stimulating hormonal gastrin mechanism, or (c) on the postresection achlorhydria due usually to atrophic lesions in the preserved fundal area of the stomach. The testing of acid and mucoprotein response to insulin and of the acid response to histamine may give complete information on the mechanism of the secretory dysfunction observed.

If the insulin test shows absence of acid response and presence of mucoprotein response, and the histamine test shows the presence of acid, then the absence of the acid response to insulin does not depend upon the severance of vagi but merely upon neutralization achlorhydria or removal of the gastric antrum with its hormonal mediating secretory mechanism. When this occurs, the preservation of the secretory

response of glandular mucoprotein to insulin indicates that the vagi nerves were not completely cut.

On the other hand, if not only acid but also the mucoprotein response is abolished after insulin, but both are preserved after histamine, then complete severance of the vagi nerves can be postulated.

Finally, if both the acid and mucoprotein responses are absent following insulin administration, and both are also absent following histamine stimulation, then no conclusion concerning the completeness of vagectomy can be made, since the abolition of the response to histamine indicates an associated postgastrectomy atrophic lesion of the gastric mucosa. The absence of the acid as well as the mucoprotein response to insulin can depend upon an atrophic lesion as well as on the vagectomy.

The disturbances of gastric secretion observed after partial gastrectomy may be explained. The glandular mucoprotein response is retained because part of the mucoprotein secreting area in the fundus of the stomach is preserved. The acid response is depressed because the pyloric antrum, site of hormonal mediation, is removed. In the vagectomized stomach the glandular mucoprotein and acid are not secreted in response to central nervous stimulation, but their secretion is preserved following humoral stimuli. Thus, one may better evaluate the status of the stomach secretion of acid and mucoprotein after combined bilateral vagectomy and gastrectomy.

A study of the gastric mucosa of 33 dogs is presented to evaluate the effects of alterations in the secretion of glandular mucoprotein. The dogs were sacrificed at varying time intervals after bilateral vagectomy alone or combined with partial resection. This study showed that normally preserved mucous cells of the surface epithelium and of the gastric glands were found in the stomachs of the dogs. These mucous glands were filled with secretory granules when the animal was sacrificed during the resting phase, and the cells were partially discharged of their contents when the animal was sacrificed during the digestive period. It was observed that in the vagectomized stomach the discharge of mucous secretion from the neck glands proceeds following humoral stimulation, even if the central nervous stimuli are abolished as by vagectomy. This was correlated with the preserved secretion of glandular mucoprotein in vagectomized human beings following histamine stimulation and is dependent upon the same mechanism as observed in the human being.

Since the secretory patterns are altered in nonoperated pathologic stomachs such as those presenting atrophic inflammatory or degenerative lesions of the gastric mucosa either alone (pernicious anemia, atrophic gastritis) or associated with carcinoma, one may have no response of free acid and glandular mucoprotein to insulin; in other words, the negative pattern of response. Regarding the absence of atrophic lesions of the gastric mucosa, it was found that no relevant cytologic lesions could be demonstrated in postoperative gastric specimens that would account for secretory alterations regardless of whether partial gastrectomy alone, vagectomy alone, or the combined procedures were performed. The authors noted that the columnar surface epithelium maintained its integrity and that the granules in the mucous cells of the neck of the fundic glands were well preserved. Thus, the absence of atrophic lesions in the mucous cellular elements of the gastric mucosa following vagectomy indicates that the abolition of mucoprotein response to insulin under these circumstances would depend upon severance of the vagi nerves and not upon atrophy of the mucosa.

In the vagectomized stomach the glandular mucoprotein and acid are not secreted in response to the central nervous stimulation but their secretion is preserved following humoral stimuli.

JOHN E. KARABIN, M.D.

The Present Status of Treatment of Ulcer (Der gegenwartige Stand der Behandlung der Ulkuskrankheit). LEO NORPOTH. *Deut. med. Wschr.*, 1952, 77: 1281.

Ulcer patients who are allergic to milk or have an aversion to it should not be forced to consume it. Small meals at frequent intervals are beneficial. Excessive amounts of sugar or salt should be avoided. An effort should be made to break the monotony of the diet. The patient's teeth should be given proper attention.

A patient with an acute ulcer should be confined to bed and removed from his usual environment.

Jejunal feedings put the stomach at rest but necessitate administration of antacids, which, however, are not always able to neutralize the gastric acids and prevent the resulting gastritis. Therefore the author no longer employs this method of alimentation.

Hot water bags applied to the epigastrium stimulate the blood supply to the stomach and have a beneficial psychotherapeutic effect.

Smoking must be strictly forbidden. While the ulcer is in the acute stage, alcohol should be completely avoided; small amounts of it may be allowed later on.

Various resins which, due to their colloidal properties, absorb acids have to a great extent replaced alkaline powders or liquids. Atropine deserves its popularity because it is clinically effective.

The results of administration of tetraethylammonium or hexamethonium iodide are frequently disappointing but their introduction has paved the way to the employment of other ganglioplegic drugs such as banthine.

Extracts of duodenal or gastric mucosa have a nonspecific stimulating effect and are clinically efficient in many instances. The effect of desoxycorticosterone is not very impressive.

Clinical observations on 30 patients have convinced the author of the efficiency of licorice juice which has been introduced on a purely empirical basis. Its effect on gastric ulcers has been found to be greater than on duodenal ulcers.

JOSEPH K. NARAT, M.D.

Surgical Treatment of Chronic Gastric and Duodenal Ulcers (Die chirurgische Behandlung des chronischen Magen-und Duodenalgeschwuers). R. NISSEN. *Deut. med. Wschr.*, 1952, 77: 1277.

Some surgeons recommend conservative treatment of perforated peptic ulcer with Wangensteen's decompression and antibiotics, if the perforation did not occur during the postprandial period and if treatment can be instituted within 6 hours after the accident. Such therapy is not infrequently followed by development of a subhepatic or a subphrenic abscess, which gives an unfavorable prognosis. Antibiotics are likely to obscure the picture of advancing peritonitis and thus a false sense of security may be created. Therefore, the author is opposed to this method, unless a profound shock contraindicates an immediate surgical intervention.

In favorable cases gastric resection is the method of choice because, in 50 per cent of cases, after simple suturing of the perforation the ulcer remains active. Suturing of ulcer, supplemented by gastroenterostomy, is followed by an anastomotic ulcer in a large percentage of cases.

If a massive hemorrhage is preceded by repeated episodes of bleeding, resection is indicated and gives a better prognosis than conservative treatment.

Marked cicatricial stenosis is also best relieved by gastric resection. Gastroenterostomy is reserved only for elderly patients in a poor general condition.

In the author's experience, malignant degeneration of gastric ulcers is not as frequent as some statistics indicate. Operation is indicated in prepyloric ulcers and in those located high in the stomach because in these types malignant degeneration is relatively frequent. On the other hand, an operation for an ulcer on the lesser curvature requires stricter indications.

As to vagotomy, the author's results correspond to those obtained in the Mayo Clinic. Vagotomy does not appear to reduce the incidence of marginal ulcers following gastroenterostomy. Conversely, the latter, combined with vagotomy, not always prevents the dumping syndrome. Vagotomy should be employed only if local or general conditions contraindicate gastric resection. It is also the method of choice in the treatment of an anastomotic ulcer following gastric resection.

If a duodenal ulcer is not resectable, gastroenterostomy alone or supplemented by vagotomy is, in the author's opinion, preferable to gastric resection. However, it is believed that the great majority of duodenal ulcers are resectable.

JOSEPH K. NARAT, M.D.

Subtotal Gastrectomy With and Without Vagotomy in the Treatment of Duodenal Ulcer. VERNON A. WEINSTEIN, LEONARD J. DRUCKERMAN, PERCY KLINGENSTEIN, and RALPH COLP. *Gastroenterology*, 1952, 22: 192.

The treatment of chronic recurring duodenal ulcer which has given the most successful results has been subtotal gastrectomy. This eliminates the hormonal phase of gastric secretion and tends to neutralize the remaining acidity by permitting reflux of the alkaline biliary and pancreatic juices. There remain, however, a group of cases (3 to 8%) in which the ulcer disease recurs after this procedure. The authors compared the results in the two groups of cases: group 1—patients who underwent only gastrectomy, and group 2—those who underwent gastrectomy plus infradiaphragmatic vagotomy. All of these patients were operated on between January, 1946 and July, 1951. The treatments were alternated after the initial one-fourth of the patients, those with the worst conditions, were subjected to the combined procedure.

There were 365 patients, of whom 210 were treated by gastrectomy alone and 155 were treated by the combined procedure. Approximately one-third of the patients in each group had previous episodes of bleeding and 10 per cent of each group had previous perforation of an ulcer.

In comparing the postoperative complications of the two groups, it is evident that pulmonary complications, gastric retention, diarrhea, and substernal pain are more frequent and more distressing in group 2. This is attributed to the vagotomy per se. The remaining complications are about equally distributed and apparently not related to the particular procedure.

There was one mortality in the entire series and this occurred after a combined procedure and was caused by massive pulmonary embolus, proved at autopsy.

Using 3 months as the dividing line, the authors differentiated the immediate postoperative complaints from those which occurred later on. They showed that, although the combined procedure had a greater number of complications, they were mild, and the only severe symptoms which occurred were found in group 1. Four of the patients had pain, bleeding, or both in this very early period.

Many of the symptoms noted during the convalescent period persisted longer than the arbitrary 3 months' period, but as time went on more and more of them disappeared spontaneously. The occasional diarrhea, vomiting, dumping syndrome, and mild pain were caused by overeating and could be corrected. In the latest follow-up group the functional disturbances were greatest in group 2 patients, but all evidence of recurrent ulceration was found in the group 1 patients.

The final follow-up cases were divided into two classes, satisfactory and unsatisfactory. There were two types of satisfactory cases, the well and the improved. The latter included patients who were well except for minor symptoms. Ninety-three per cent of the patients in group 1, and 98 per cent of the patients in group 2 were well or improved. The unsatisfactory cases consisted of the patients who had recurrences, suspected recurrences, or who had symptoms great enough to be labeled unsatisfactory. In group 1 there were 10 who had proved recurrences and 2 who had suspected recurrences. In group 2

there were neither recurrences nor suspected recurrences. Two cases in group 1 and 3 cases in group 2 were labeled as unsatisfactory. In none of these cases did the patients have recurrences, but all had moderately severe pain, the dumping syndrome, severe diarrhea, or vomiting.

Study of postoperative gastric acidity was done by several methods and the results were summarized in a table. Regardless of the test used, there was a higher percentage of anacidity in group 2 than in group 1 and, since peptic ulceration is rare in the absence of free hydrochloric acid, the conclusion was that combined operation offers the best hope of preventing a recurrence. JOHN H. DAVIS, M.D.

An Analysis of the Vagotomy Controversy. GEORGE CRILE, JR. *Ann Surg.*, 1952, 136: 752.

The author reviews the history of vagotomy briefly and emphasizes the vagueness of the indications and the incompleteness of the operations performed in the past. It is stated that there was no reference to the employment of vagotomy in any series of cases of duodenal ulcer until Dragstedt began his clinical studies in 1943. He established a sound physiologic background for vagotomy in both clinic and laboratory, and recognized that vagotomy alone is accompanied by such a high incidence of gastric retention that a complemental gastroenterostomy is desirable.

In the early days of vagotomy, confusion arose because the basic differences between gastric and duodenal ulcer were not adequately appreciated and too often the results obtained in both types of ulcer were reported together. Despite the better separation of cases in more recent articles, differences in the reported results persist, and the reasons for these differences are examined and discussed.

Although some of the controversy regarding the efficacy of vagotomy with gastroenterostomy may be explained on the basis of the selection of cases, the most important factor in determining the results is the technique of the operation. It is the author's experience that gastric retention after vagotomy with gastroenterostomy is not an inevitable complication of denervation of the stomach but arises from technical factors of the gastroenterostomy.

If the stoma is to function well it must be placed exactly at the most dependent part of the stomach, as close to the greater curvature as possible, and usually close to the pylorus, just to the left of the reflection of the peritoneum of the mesocolon. This type of gastroenterostomy drains by gravity and empties the denervated stomach so rapidly that there is no more gastric retention than follows a gastroenterostomy without vagotomy. The conventional type of posterior gastroenterostomy which may be placed in the midstomach, midway between the curvatures or opposite the esophagus will not function well because the stoma is not dependent and the denervated stomach is devoid of peristalsis and must empty by gravity.

A second factor of great importance is the technique employed in making the anastomosis. The cuff should be made as small as possible so that there will be no valvelike obstruction of the stoma. If techniques with three rows of sutures are used or if a wide cuff is inverted by two rows there will be a 15 to 20 per cent increase in the incidence of gastric retention in vagotomized stomachs. In 100 consecutive cases of a recent series in which a small cuff with dependent gastroenterostomy was employed, the average day of discharge from the hospital was the seventh. In no case was a secondary operation required, there were no significant gastric complications, and no patient experienced persistent retention.

It is not necessary to maintain gastric suction for more than 24 hours after surgery, provided that the stomach is aspirated once or twice daily for 2 or 3 days to be certain there is no retention. By the sixth or seventh day the patient may be discharged on a simple diet. After the sixth week no limitations are imposed on the diet or habits of living, and no medication is prescribed.

Diarrhea and belching of foul gas are not side effects of vagotomy but symptoms of a poorly constructed gastroenterostomy since retained gastric contents will ferment.

Of 147 patients operated upon more than 3 years ago, 140 have been followed up by questionnaire from 2 to 5 years, and those who have had persistent or recurrent symptoms have been recalled for examination. The patients operated upon represented 12 per cent of the total treated for duodenal ulcer, and in half of the cases indications of obstruction or a history of massive hemorrhages or perforations were present. Three per cent of the 140 patients followed up required secondary operations for marginal ulcer and 2 per cent had presumptive but not demonstrable evidence that ulceration recurred. Symptoms of marginal ulcer developed within the first 2 years after operation and no recurrences were noted in those free of symptoms for 2 or more years after operation. Side effects such as loss of weight, the dumping syndrome, or diarrhea have not been common or severe, and belching or vomiting due to gastric retention has been absent.

There have been 2 postoperative deaths in 445 vagotomies and gastroenterostomies for duodenal ulcer—a mortality rate of less than 0.5 per cent. The author prefers vagotomy with gastroenterostomy as the standard treatment for all patients with duodenal ulcer except for those who are bleeding actively at the time of operation. Moreover, the most common significant complication of the operation, marginal ulcer, responds readily to gastric resection.

If the operation is performed as described, prolonged retention is eliminated and transitory retention should not occur in over 3 per cent of the cases. Ninety-seven per cent of the patients were discharged before the tenth day. Vagotomy with gastroenterostomy affords as much protection against recurrent ulceration as three-fourths gastric resection. More radical gastrectomies result in a lower incidence of recurrent ulceration but cause an intolerably

high incidence of nutritional complications for which there is no effective treatment. Good results were obtained in 90 per cent of the cases followed up from 2 to 5 years. Three per cent required resection for marginal ulcer. J. H. MOHARDT, M.D.

Gastrectomy with Replacement. F. A. HENLEY. *Brit. J. Surg.*, 1952, 40: 118.

The Polya type of gastrectomy, although excellent in its relief of the symptoms for which it is performed, has as its primary fault the exclusion of the duodenum. In this operation the food is no longer subjected to the contact and action of the duodenal mucosa. The duodenum, except for its own idle secretions, becomes little more than an extension of the common bile and pancreatic ducts.

The majority of patients fail to gain weight after the Polya gastrectomy. Many are malnourished and probably develop deficiency states. A certain few simply exchange their ulcer syndrome for symptoms of the so-called postgastrectomy syndromes, which limits their enjoyment of life and ability to work. One came to regard these patients, therefore, as suffering from a gross disorder of physiology, due to the exclusion of the duodenum. It was believed that an attempt should be made to devise a procedure which would combine the virtues of subtotal gastrectomy and yet enable the food to be subjected to the action of the duodenum.

As it was already known from the Billroth II operation, provided a subtotal gastrectomy was performed, that the jejunum would resist recurrent ulceration, it could be reasoned that the jejunum would resist recurrent ulceration if detached as a segment to replace the stomach. Therefore, an operation has been done successfully 35 times in which the jejunum was used to replace the resected stomach and restore normal continuity of the gastrointestinal tract. A loop of jejunum was isolated with its blood supply intact and brought through a rent in the transverse mesocolon. It was anastomosed between the duodenum and remaining segment of the stomach. The area from which the segment of jejunum had been removed was then anastomosed.

The operation has been used for the following:

1. Total gastrectomy for carcinoma when the jejunal segment is anastomosed end-to-end between the esophagus and duodenum (2 cases).

2. Subtotal gastrectomy for (a) removable gastric ulcer, and (b) removable juxtapyloric ulcer, when the jejunal segment is anastomosed to the cut end of the stomach and duodenum (21 cases).

3. Subtotal gastrectomy for (a) irremovable juxtapyloric ulcer, and (b) irremovable duodenal ulcer, when the ulcerated gut has been closed proximal to the ulcer and the jejunal segment anastomosed to the cut end of the stomach and to the side of the first or second part of the duodenum (4 cases).

4. Remedial replacement for the gastrectomy syndrome when the stoma has been left intact, the efferent limb sectioned a few inches below the stoma and anastomosed to the side of the duodenum, and the afferent limb resected close to the stomach, its gastric end being closed and the cut ends of the jejunum reunited (4 cases).

5. Jejunal replacement following subtotal gastrectomy for perforation of gastric ulcer (1 case) and duodenal ulcer (3 cases).

The results in the 35 patients subjected to this operation are excellent; the patients gain weight and energy and are free from lassitude and postprandial dyspepsia. Their appetites are good and bowel function is returning to normal. The follow-up so far is short (3 months) and a longer period will be needed to study these patients. So far the immediate results justify the claim that the preservation of normal physiology of the duodenum plays an important part in the postgastrectomy syndrome.

EDMUND R. DONOGHUE, M.D.

Chronic Invagination of the Jejunal Loop into the Gastrectomy Stoma (L'Invagination Chronique de L'Anse Jéjunale Dans La Bouche de Gastrectomie). FRANÇOIS MOUTIER, ANDRÉ CORNET, and FAROUK SUKAN. *Sem. hôp. Paris*, 1952, 28: 2785.

Prolapse of a jejunal loop into the anastomotic stoma is a rare complication of subtotal gastric resection. Gastroscopic examination of 506 gastrectomized patients with dyspeptic symptoms revealed 8 patients with this condition. There was prolapse of the efferent loop in 4 cases and of the afferent loop in 2 cases. Both loops were invaginated in 2 patients. The average age of these patients was 48 years. Seven were females and 1 was male. The cause in most cases seemed to be reverse peristalsis. Gastric hypotonicity may play a part. The authors do not give details of the type of the gastrectomies or whether the anastomoses were isoperistaltic or antiperistaltic, antecolic or retrocolic.

The most common symptoms are epigastric pain and vomiting. The diagnosis may be established roentgenographically in some cases, the most characteristic finding being the presence of a filling defect in the shape of a half-moon at the gastrojejunal stoma. Gastroscopy, however, is a more reliable diagnostic procedure since the gastrojejunal stoma can be easily visualized following gastric resection.

The condition must be differentiated from gastritis, perigastritis, recurrence of gastric cancer, and gastrojejunal ulcer.

In most cases conservative therapy is to no avail and reoperation is necessary. The invagination must be reduced and the jejunal loops fixed so that recurrence will not take place.

FREDERICK W. PRESTON, M.D

Analysis of an Operative Material of Gastrointestinal Cancer. YNGVE EDLUND and LARS GÖTHMAN. *Acta chir. scand.*, 1952, 103: 306.

This is a study of 658 patients operated upon during a 15 year period from 1935 to 1949. The material includes cancer of the stomach, colon, and rectum, and precludes cancer of the small intestines inasmuch as only 6 patients with this condition were

operated upon during the same 15 years. There were 387 cases of cancer of the stomach, 131 of cancer of the colon, and 140 of cancer of the rectum.

Two-thirds of the patients with cancer of the stomach were males whereas among those with cancer of the colon less than half were males. The number of patients over 70 years of age was higher in the colon and rectal group than in the group with gastric cancer. There were 137 postoperative deaths recorded, but it was noted that there was a decrease in mortality rate in the last 5 years following radical operations for gastric cancer. Deaths from cancer of the colon and of the rectum remained unchanged during this period.

The single outstanding finding in the entire survey was the fact that patients invariably came too late for treatment; one-seventh of the patients had a history of onset of more than 1 year, half of the group already had positive metastases in the lymph glands, and one-fifth had the entire stomach involved at the time of operation.

A more vigorous campaign to enlighten the public on early diagnosis is recommended.

STEPHEN A. ZIEMAN, M.D.

Congenital Intestinal Atresia with Severe Stenosis in the Newborn: A Report on 79 Consecutive Cases. J. H. LOUW. *South Afr. J. Clin. Sc.*, 1952, 3: 109.

The author presents a detailed analysis of 79 consecutive cases of intestinal atresia with severe stenosis which were admitted to The Hospital for Sick Children, London, between 1926 and 1951.

The incidence of the condition in this series was 1 to 3,000 births. The sex distribution was approximately equal. Thirty-eight per cent of the cases were premature infants, and 76 per cent of these had associated anomalies. The duodenum was involved in 40 per cent of the cases, the ileum in 25 per cent, the jejunum in 15 per cent, and the colon in 4 per cent. Multiple lesions occurred in 18 per cent. The high incidence of mongolism in patients with duodenal atresia is stressed; 9 mongols were found in 31 such patients. Anomalous fixation of the mesentery was noted in 45 per cent of the patients with jejunoileal and multiple occlusions, and volvulus complicated two-thirds of these.

The autopsy and operative findings emphasized the frequency and early onset of necrotic changes in the dilated bowel proximal to jejunoileal occlusions, an important consideration in the treatment of these conditions. The life expectancy of untreated patients is shown to be from 5 to 6 days.

Repeated vomiting was the most outstanding symptom, usually beginning early, although it was often delayed by as much as a week or 2 in the patients with stenosis. Stools were passed by 40 per cent of the infants with complete occlusion and by 80 per cent of those with incomplete lesions. Fever is an ominous sign, as is extreme tympanites. Incomplete obstruction produced the classic signs of visible peristalsis, borborygmus, and palpable mass, but high complete lesions resulted in negative abdominal findings in 50 per cent of the cases.

Plain x-ray examinations of the abdomen proved most valuable in the diagnosis, but barium given either orally or per rectum was remarkably uninformative and led to serious complications.

The over-all operative mortality was 82 per cent, but this has shown steady improvement and in the last 10 years had dropped to 76 per cent. Incomplete occlusions resulted in a lower mortality (67%), as did proximally situated single lesions. Multiple lesions were uniformly fatal. Over half of the entire series of patients died within 48 hours of operation. Analysis of these incriminates late treatment. Yet this was not the only factor, for 36 per cent of the infants operated upon within 48 hours succumbed soon afterward. Improvement in preoperative and postoperative care should reduce this figure. The importance of gastric decompression and of maintenance of a clear airway is stressed. The deaths which occurred later averaged about 30 per cent regardless of the time of operation. In these, the outcome was shown to be related to the method of treatment, which in turn was related to the site of obstruction. Excessive fluid loss, obstruction at the site of anastomosis, and wound disruption were the chief causes of death in these cases.

Enterostomy proved uniformly unsuccessful because of fluid loss from the fistula, and primary anastomosis resulted in 90 per cent mortality. Resection with immediate anastomosis was more successful and is recommended. The author believes that removal of the devitalized segment of the proximal bowel obviates many of the complications usually encountered in the treatment of atresias of the small bowel. There were no cases of isolated large bowel occlusion in this series, but colostomy when indicated is thought to be safe in the treatment of this condition. JOHN J. MURPHY, M.D.

Some Observations on the Function of the Small Intestine after Gastrectomy. A. J. GLAZEBROOK and RICHARD B. WELBOURN. *Brit. J. Surg.*, 1952, 40: 111.

After subtotal or total gastrectomy of the Polya type, food enters the small intestine almost at once without being prepared by either the stomach or the duodenum, and its bulk or hypertonicity may lead to a number of syndromes. The authors have investigated the increased motor activity of the intestine that may occur. In particular, they investigated the activity of the small intestine in relation to the "efferent loop dumping syndrome" and to postgastrectomy steatorrhea.

In 23 patients who had had previous gastric resections, a Miller-Abbott tube was introduced into the efferent loop. The balloon was inflated and only 3 of the 23 patients developed "dumping" symptoms. Kymography showed simultaneous increased motor activity.

Hypertonic solutions introduced into the jejunum caused dumping symptoms in 9 of 23 patients.

Dilution of the hypertonic solutions with tap water would relieve the symptoms. The intramuscular or intravenous injection of 100 mgm. of C_5 or C_6 (methonium salts) caused a loss of intestinal movement and tone. The symptoms were relieved with the exception of nausea. When C_6 was injected before the instillation of 100 c.c. of concentrated solution into the jejunum the symptoms of dumping, with the exception of nausea, were prevented.

A hypertonic solution of glucose mixed with barium was given to 5 patients to obtain a visual record of the meal. Dumping symptoms and marked activity of the jejunum were observed in each case. In 1 case a peristaltic rush caused the head of the meal to reach the hepatic flexure of the colon in 5 minutes. Methonium salts tended to reduce the activity seen roentgenologically.

In postgastrectomy steatorrhea C_6 had no effect in 4 mild cases, but it increased the absorption of fat in 2 cases of moderate severity, presumably by reducing the rate of passage through the small intestine.

The authors believe that the efferent loop dumping syndrome is caused by increased motor activity in the jejunum and that this provides an adequate stimulus for the production of symptoms.

EDMUND R. DONOGHUE, M.D.

Plication of the Small Intestine for Obstruction Due to Adhesions—Noble Procedure. ELDEN C. WECKESSER, JOHN F. LINDSAY, JR., and FRANK A. CEBUL. *Arch. Surg.*, 1952, 65: 487.

Obstruction of the small intestine due to adhesions is difficult to cure permanently. This is true especially when the patient has had previous laparotomies for the same condition. Gentle handling of the tissue, and the avoidance of infection, the irritation of glove powder and other foreign bodies will not prevent the reformation of adhesions from raw surface areas residual at the time of surgery. For this reason, relief of obstruction by lysis of adhesions is frequently temporary.

Although the prevention of peritoneal adhesions, except by technical factors, is yet to be accomplished, their control was reported successful by Noble as early as 1937. This author has used his procedure successfully since 1920. The method consists briefly of suturing the bowel back and forth upon itself in an orderly fashion along the mesenteric margin. The bowel then becomes adherent in this orderly plicated pattern rather than at random.

Points in technique which, from their experience and that of others, the authors feel should be emphasized are the following:

1. Completely free all adherent loops of bowel.
2. Suture adjacent loops along mesenteric borders.
3. Begin and end sutures 3 cm. from each end to keep turns gentle.
4. Make loops of proper length to fit freely across the peritoneal cavity (average, 6 to 8 inches or 15 to 20 cm.).
5. Suture bowel securely, using moderately heavy chromic absorbable (gut) sutures.
6. Close folds of mesentery to prevent free loops of bowel from entering, if the entire small bowel is not plicated.
7. Make adequate plication to cover all raw surface areas.
8. Stimulate the bowel after operation.

The second and third items are probably very important in keeping the bowel loops as free as possible and the 180 degree turns at the ends of the folds as gentle as possible.

The folds should be judged long enough to lie freely across the interior of the peritoneal cavity without being crowded at the ends. On the other hand, the folds should not be so short that unnecessary plications are employed.

The authors believe that the bowel should be plicated, preferably after intestinal obstruction has been overcome, by Miller-Abbott intubation. If surgery is undertaken in acute cases, a Miller-Abbott tube should be in place to decompress the dilated loops at operation; otherwise difficulty in returning the plicated bowel to the peritoneal cavity may be encountered.

BENJAMIN GOLDMAN, M.D.

Choice of Operations for Acute Malignant Obstructions of the Colon. RALEIGH R. WHITE. *Surg. Clin. N. America*, 1952, 32: 1475.

The author warns surgeons against taking "short cuts" in the management of patients with acute obstruction of the large bowel caused by carcinoma. Preliminary decompression and staged procedures are preferred to the dangers of removing the obstructing lesion as a primary procedure.

For obstructing carcinoma of the right colon the author performs either a cecostomy or an ileotransverse colostomy. If the ileocecal valve is competent, causing a true closed-loop obstruction, cecostomy is utilized. If the ileocecal valve is incompetent, an ileotransverse colostomy is used.

For obstructing carcinoma of the left colon the author performs a loop colostomy in the right half of the transverse colon. The bowel is usually opened through an incision in the anterior bowel wall approximately 48 hours after exteriorization. If distention is extreme, however, the bowel is decompressed immediately with a needle, either with or without catheter drainage.

Using these preliminary procedures for acute obstruction caused by carcinoma and resecting the cancer later, the surgeons at the Scott and White Clinic have obtained excellent results. Prior to 1943, in a consecutive series of 36 patients with obstructing carcinomas of the colon requiring staged operations, subsequent bowel resections were done with an operative mortality of 8.4 per cent and a 5 year survival rate of 47.2 per cent. During the same period, 241 patients had elective resections of the colon with a mortality rate of 9.5 per cent, and a 5 year survival rate amounting to 55.2 per cent.

WILLIAM T. FITTS, JR., M.D.

Satisfactory Colpocleisis Combined with Anal Closure after Severe Damage to Bladder and Rectum by Radium. A. W. N. DRUITT. *Brit. M. J.*, 1952, 2: 856.

The treatment of vesicovaginal and rectovaginal fistulas is not satisfactory. In certain instances, usually following radiation therapy of cancer of the uterine cervix, colpocleisis is indicated. The vagina is closed partially or totally according to the pathological findings. In some instances of loss of the bladder floor a portion of the vagina may be used in repair.

The author presents a case of vesicovaginal and rectovaginal fistula following radiation therapy for cancer of the cervix. A preliminary left colostomy was done, followed shortly by an unsuccessful repair of the vesicovaginal fistula. There was destruction of the bladder sphincter, and the bladder floor extroverted into the vagina. A third procedure was done which fixed the bladder to the anterior abdominal wall to reduce the extroverted bladder, plus a partial closure of the vagina. Because of an incontinent anal sphincter the orifice was closed, but it did not stay closed. Ten months later the vagina was completely closed. Thus the rectum and distal colon in communication with the bladder and vagina acted as a urinary reservoir. This was drained by inserting a catheter into the distal orifice of the colostomy. The patient was feeling fit 2½ years after the last surgery, and 6½ years after the diagnosis of cervical cancer. She does not wear a bag, and senses when either the proximal or the distal colostomy needs emptying.

RICHARD L. LAWTON, M.D.

Carcinoma of the Rectum and Rectosigmoid: Surgical Treatment. G. V. BRINDLEY and J. F. MCKENNEY, JR. *Surg. Clin. N. America.* 1952, 32: 1485.

The authors report a study of 219 patients with operable carcinoma of the distal 15 cm. of large bowel treated during the last 20 years. Six operative procedures were used: abdominoperineal resection in 95 instances; anterior resection with primary anastomosis in 41 instances; anterior excision with abdominal colostomy in 23 instances: posterior cautery excision with colostomy in 48 instances; posterior cautery excision without colostomy in 8 instances; and pelvic exenteration in 4 instances.

Abdominoperineal resection was considered the procedure of choice for all lesions in the lower 8 cm. of rectum, and for large tumors above this level. The authors report a mortality rate of 3.1 per cent for this operation, and a 5 year disease-free survival rate of approximately 45 per cent.

Forty-one patients were treated by anterior resection with primary anastomosis. The authors limit anterior resection to lesions at least 8 cm. above the dentate line. The following types of carcinoma lying above this level are considered favorable for anterior resection: papillary lesions; circumscribed carcinomas confined primarily to the mucosa; small neoplasms of low grade malignancy; and certain tumors with distant metastases. Anterior resection is usually supplemented by a catheter cecostomy.

Anterior excision with abdominal colostomy is the same operation as abdominoperineal resection except that a small rectal stump below the growth is not removed. The advantage of this procedure is that the magnitude of the operation is lessened by avoiding what ordinarily would be the perineal part of the combined procedure; it was reserved for poor risk patients.

An abdominal colostomy, followed by posterior cautery-knife excision, was formerly used rather extensively by the authors, but was used only seven times in the last 5 years. The procedure is recommended for the removal of a carcinoma of the lower rectum and midrectum, in selected cases, more particularly the aged and poor risk patients. It is advised for palliative removal of large, ulcerated, infected, perforated, incurable lesions of the lower rectum. Posterior cautery knife excision without abdominal colostomy has been supplanted by methods which more adequately remove the gland-bearing tissue of this region.

Pelvic exenteration was performed in 4 instances. Two of these patients survived 2 years and 4 years, respectively. Two are alive 10 months and 1½ years, respectively, after operation. Exenteration is considered essentially a palliative procedure and the authors believe it will be found indicated only rarely.

WILLIAM T. FITTS, JR., M.D.

The Surgical Treatment of Malignant Rectal Polyps. H. E. LOCKHART-MUMMERY and CUTHBERT E. DUKES. *Lancet. Lond.*, 1952, 265: 746.

The epithelial tumor of the large bowel which has been removed and thought to be benign, occasionally is reported as cancer. This poses an important question to the surgeon. The authors have sought to evaluate a group of malignant polyps, removed by local excision, in order to give clearer insight into the course of action to be taken by the surgeon. The method used is essentially a clinicohistological evaluation.

In the natural history of a large bowel polyp, there are all gradations, from a mucus-secreting adenoma to invasive carcinoma. For the purposes of this discussion three histologic types are considered: (1) focal carcinoma, (2) invasive carcinoma with a free margin, and (3) invasive carcinoma without a free margin. Carcinoma in situ was not considered. In all, 47 cases were evaluated, and in all but a few the clinical impression was that of a benign lesion. All of these tumors were removed by local excision. A further series of 18 cases of similar gross-appearing tumors was available for study, and treated by more radical means.

There were 17 patients with focal carcinoma (malignancy confined to the mucosa), and all but 1 are reported alive. The 1 death reported occurred 4 months after surgery and was due to cardiac failure. Histologically, these tumors were of low or average

grade malignancy. In this type of tumor local excision is satisfactory, but in high grade malignancy more radical measures should be considered.

It was found that histologic criteria were particularly important in the cases classed as invasive carcinomas. Seven patients were considered as having low grade malignancy; all are living from 2 to 5 years later.

Three cases of high grade malignancy were studied, and in each instance local recurrence took place. These were picked up in re-examination and a radical procedure was carried out; one patient died after surgery, 1 was alive 4 years later, and the last refused surgery and died of his disease.

In the group of average invasive malignancy 20 cases were found. There were 9 recurrences, and the majority of the patients were treated by combined excision. Four of the 9 had lymph node metastases. It is in this group that the "apparent free-margin" of tissue seems to be of importance. Among 5 cases in which there was an adequate free margin there was only 1 recurrence. Among the 10 with a questionable free margin there were 8 recurrences.

The authors emphasize that one should not adopt an optimistic view regarding local excision of malignant large bowel polyps. With a greater knowledge of the natural history of the disease plus clinicopathological correlation, one will be able to predict with more certainty the results from a given procedure. RICHARD L. LAWTON, M.D.

The Present Day Treatment of Cancer of the Rectum (Tendances actuelles dans le traitement chirurgical du cancer du rectum). P. CHALNOT and J. GROSDIDIER. *Lyon chir.*, 1952, 47: 787.

The authors present a review of the study of the case histories of 110 patients with carcinoma of the rectum who were operated upon during the past decade. A statistical analysis is given of the 5 year survival of patients operated upon for rectal carcinoma with respect to the procedure employed.

The authors conclude that the operative procedures, where the anal sphincter is preserved, are feasible in only approximately 20 per cent of cases of carcinoma of the rectum. The criteria for preservation of the sphincter, according to these authors, are that the tumor must be small (measuring no more than 4 cm. in diameter), that it be freely movable and situated at a minimal level of 10 to 15 cm. above the external anal sphincter. Lesions which are above this level, according to these authors, should be treated by an abdominal perineal resection, and their statistics indicate that this procedure was carried out in the majority of instances.

It is interesting to note that most American clinics have abandoned the use of the sphincter-preserving procedures for lesions that are within the range of the rectosigmoid junction. Survival and recurrence statistics seem to bear out the advisability of the complete removal of the rectosigmoid and rectum for lesions in and about the rectosigmoid junction. ORVILLE F. GRIMES, M.D.

LIVER, GALLBLADDER, PANCREAS, AND SPLEEN

A Statistical Study of Certain Hepatic and Biliary Conditions in the Area of Modena (Rilievi statistici su alcune affezioni del fegato e delle vie biliari nel settorato di Modena). GIOVANNI SPIGOLON. *Arch. ital. mal. app. diger.*, 1952, 18: 151.

The author reviews 5,921 autopsies performed at the Pathological Institute of Modena, from 1911 to 1951. There was an incidence of 1.86 per cent for the Morgagni-Laennic type of cirrhosis, and an increased incidence shortly after the war, probably due to the nourishment factor. It was more dominant in the male, the ratio being 4 to 1. In respect to age, the highest occurrence lies in the age group between 51 and 60 years.

The volume of the liver was diminished in 69 per cent, nonmodified in 18 per cent, and increased in 13 per cent. There were 14 cases (13%) of esophageal varices with frequent findings of rupture and hemorrhage.

Primary tumors were found in 18 instances, i.e., 2 sarcomas and 16 carcinomas (0.3%). Clinical diagnosis was incorrect in 45 per cent of cases.

Cancer-cirrhosis was found in 5 instances of males from 50 to 59 years of age.

Calculi were found in 76 cases (1.28%) and the gallbladder was the seat of the stones in 76 per cent. One case of intrahepatic stone was encountered. The sex ratio was 3.1 to 1, with females most often involved.

Cancer of the gallbladder and biliary ducts was found in 8 cases (0.13%). The gallbladder was commonly involved in females and the bile ducts in males. The tumor was constantly found in the fundus of the gallbladder when it involved this part of the biliary tree. A case of metastasis of the Krukenberg type is described. Perforation with peritonitis was found in 50 per cent of the cases.

LUCIAN J. FRONDUTI, M.D.

Replacement of Bile Ducts with Free Vein Grafts; Results of Preliminary Experiments (Réparation des voies biliaires par greffe veineuse libre; Premiers résultats expérimentaux). DEVIN, BONNEAU, COURBIER, INGLESAKIS, and C. JEAN. *Presse méd.*, 1952, 60: 1286.

Free vein grafts were used to replace segments of the common and hepatic bile ducts in 20 dogs. In 14 animals, which form the basis of this study, a valveless section of the jugular vein was anastomosed to the proximal end of the duct and the opposite end of the graft was implanted into the duodenum. A piece of polythene tubing was placed inside the graft for support. The mortality of this procedure was approximately 50 per cent because of bile peritonitis, disruption of the duodenal end of the suture line, infection, or hemorrhage.

Four animals were sacrificed at 9, 15, 19, and 30 days after operation, respectively, and a specimen consisting of the bile duct, graft, duodenum, and

pancreas was removed en bloc. In each case the grafts were intact. Microscopic sections of the grafts showed destruction of the endothelium where there was pressure on the graft by the polythene tube. At the duodenal end of the graft there was replacement of the endothelium with duodenal mucosa, and at the opposite end of the graft there was a growth of bile duct epithelium to replace the endothelium.

The animals were not followed up long enough to determine whether or not the grafts will remain functional or whether stricture or obliteration may ultimately take place.

FREDERICK W. PRESTON, M.D.

The Effect of Thoracolumbar Sympathectomy and Vagus Resection on Pancreatic Function in Man. ROBERT B. PFEFFER, HUGH E. STEPHENSON, JR., and J. WILLIAM HINTON. *Ann. Surg.*, 1952, 136: 585.

The secretin duodenal drainage test provides an excellent means of determining the pancreatic function in man. In an effort to evaluate the findings following surgical treatment of conditions involving the ablation of the vagus and sympathetic nerves in the functional innervation of the pancreas a bilumen gastroduodenal tube was employed.

Pancreatic function in response to secretin and vagal stimulation was studied in 10 normal individuals, 10 patients subjected to bilateral thoracolumbar sympathectomies and splanchnicectomies, and 10 patients subjected to bilateral vagus resections. The average postoperative period was 3 years and 8 months for the sympathectomy group, and 4 years and 8 months for the vagus resection group.

It was seen that stimulation of the vagus nerves by insulin hypoglycemia in normal patients increased enzyme (amylase) output 89.5 per cent over that induced by secretin stimulation alone. On the other hand, bilateral thoracolumbar sympathectomy and splanchnicectomy did not alter the physiologic function of the pancreatic gland. Secretion in this group was comparable to that of the normal individuals with an increase of 93.8 per cent in enzyme output following vagal stimulation.

The patients subjected to vagus resection, however, demonstrated significant changes in pancreatic function both in response to secretin and secretin plus insulin. A decrease of 337.5 per cent in total enzymatic secretion was observed under maximal hormonal and nervous stimulation in this group.

STEPHEN A. ZIEMAN, M.D.

Chronic Pancreatitis Treated by the Roux Type of Jejunal Anastomosis to the Biliary Tract. PHILIP F. PARTINGTON, *Arch. Surg.*, 1952, 65:532.

Archibald discovered that transduodenal section of the sphincter of Oddi for the removal of a stone impacted in the ampulla of Vater caused improvement in coexisting chronic pancreatitis. This led Doubilet and Mulholland to undertake sphincterotomy as a method of treatment of pancreatitis. Palliative bypass of cancer of the head of the pancreas, done for many years by anastomosis of the gallbladder to the stomach, duodenum, or jejunum, produced 15 per cent 5 year survivals among cases which Walters said must be assumed to have been inflammatory. The present article advocates such a bypass by means of a Roux-Y segment of jejunum as definitive treatment for chronic recurring pancreatitis.

Both choledochojejunostomy and cholecystojejunostomy were used in the present study. Operative cholangiograms served as the basis for the choice of operative procedure. In 5 cases, a Roux-Y loop of jejunum 18 to 20 inches (46 to 51 cm.) in length was brought up posterior to the colon to the right of the middle colic vessels and anastomosed end-to-end to the fundus of the gallbladder. Intestinal continuity was re-established by an end-to-side jejunojejunostomy. No drainage of the biliary tract was employed.

In 2 cases with previous cholecystectomy, the common duct was divided and the proximal end anastomosed end-to-end to a Roux-Y segment of jejunum over a T-tube. The T-tubes were left in place for approximately 1 month postoperatively.

If spasm of the sphincter of Oddi is accepted as the chief etiologic agent in the production of chronic recurring pancreatitis, many of the apparent discrepancies regarding the etiologic factors in this disease can be reconciled. There is too much evidence against a common pathway being present in all cases to believe that a reflux of bile into the pancreatic duct is necessary. A recent postmortem cholangiogram taken with an injection into the common duct did not visualize the pancreatic duct in a patient dying of pancreatitis. Subsequent injection of the pancreatic duct and dissection demonstrated a septum running to the tip of the papilla. Lium and Maddock demonstrated experimentally that occlusion of the pancreatic duct alone could produce pancreatitis with an actively functioning gland. Occlusion of the main pancreatic duct can be produced by spasm of the sphincter of Oddi. Even when a septum separated the pancreatic from the common duct, Baldwin showed that the two ducts entered the duodenum side by side through the same papilla, except in a very few instances. Spasm of the sphincter of Oddi is produced in a variety of conditions, including biliary tract disease, peptic ulcer, and psychogenic disturbances. Various observers have weighed the importance of these factors differently.

Most of the surgical methods of treating chronic pancreatitis depend upon relief of spasm of the sphincter of Oddi whether it is achieved by cutting the sphincter, denervating it by vagotomy, or removing the inciting cause of spasm by cholecystectomy, subtotal gastric resection, or a short-circuiting procedure. Cholecystojejunostomy and choledochojejunostomy both prevent a rise in the common duct pressure, which is a potent reflex agent for throwing the sphincter into spasm and maintaining the spasm once it is produced. These operations likewise per-

mit a short-circuiting of the bile, so that pancreatic juice is allowed full use of a reduced common pathway when one is present.

Cholecystojejunostomy is a much simpler procedure than choledochojejunostomy when a fairly normal gallbladder is present, and there is less chance of stenosis of the anastomosis. Sphincterotomy is difficult in some cases of pancreatitis with marked angulation and narrowing of the pancreatic portion of the common duct. There is always the possibility that this narrowed portion may become completely obliterated, as in 1 of the cases presented.

The period of follow-up of the present series of cases is much too short for valid conclusions in a chronic recurring disease of this sort. Freedom from attacks for even a short time is highly encouraging, however, in certain severe cases in which multiple previous operations had failed to relieve almost constant pain. Chronic alcoholism apparently predisposes to a continuation of attacks of greatly reduced severity. BENJAMIN GOLDMAN, M.D.

Total Pancreatectomy. A. GOUREVITCH and A. G. W. WHITFIELD. *Brit. J. Surg.*, 1952, 40: 104.

The authors report on a patient subjected to total pancreatectomy for what was believed at the time of operation to be a carcinoma of the pancreas but later proved to be chronic pancreatitis secondary to obstruction of the duct of Wirsung by a papilloma. The entire pancreas and duodenum were removed as well as the spleen. An end-to-side gastroenterostomy was performed and an enteroenterostomy was carried out. An end-to-side anastomosis was made between the common bile duct and the jejunum. The patient stood the operation well but his convalescence was interrupted by two small hematemeses on the tenth day and by chills and fever on the eighteenth and twenty-eighth days. These febrile episodes were thought to be due to ascending cholangitis and both responded immediately to the administration of penicillin and sulfonamides. The patient was discharged to his home 2 months after the operation on a diet of 200 gm. of carbohydrate, 75 gm. of fat daily, unlimited protein, a morning dose of 15 units of soluble insulin, 15 units of protamine zinc insulin, and 60 gr. of pancreatin three times daily.

During the 14 months following discharge from the hospital, he had 17 bouts of fever, most of which were accompanied by chills, and in some attacks there was pain under the right costal margin and the liver was enlarged and tender. Each attack resolved rapidly with penicillin and sulfonamide therapy, but the effect of these repeated cholangitic episodes was to render the patient quite unfit to return to work. Continuous administration of sulfathiazole and phthalyl sulfathiazole failed to prevent the bouts of cholangitis. On the basis of the authors' experience with another case they anastomosed the gallbladder to the efferent loop of the jejunum. Six months elapsed since this second operation; no further cholangitic episodes occurred and the patient felt completely normal.

The relatively small amount of insulin required by this patient is in accord with the experience of previous writers, most of whom were able to attain adequate stabilization on a daily dosage of 40 units or less. The low requirement of insulin in this patient postoperatively, and the reports of similar conditions in other patients subjected to total pancreatectomy, lend strong support for the current belief that there are important extrapancreatic factors in diabetes. The literature contains numerous references to the marked insulin sensitivity of depancreatized human beings, and Waugh and others described a patient who died from hypoglycemia following total pancreatectomy. EARL O. LATIMER, M.D.

Splenic Studies. HARRIS B. SCHUMACKER, JR., and HAROLD KING. *Arch. Surg.*, 1952, 65: 499.

It is recognized that the conclusions following splenic studies may be erroneous unless they are based upon a large experience and a period of observation extending over many years. Certainly the present studies do not permit us to draw statistically valid conclusions. From their studies the authors have derived the following impressions: expectant treatment in cases of portal hypertension associated with gastroesophageal bleeding in children is almost certain to be followed by bad results. The results from splenectomy alone are so poor as to warrant condemnation of this procedure as the primary method of treatment. Although the results are not perfect, everything suggests that the best available method of initial treatment is splenectomy and splenorenal anastomosis by the suture technique. It is entirely likely that the small size of the splenic vein in very small children may add to the possibility of failure. Adequate anticoagulant therapy appears to be a useful adjuvant in cases of venous shunt operations. When splenectomy and splenorenal anastomosis are followed by recurrence of the gastroesophageal bleeding, portacaval anastomosis should be carried out if possible. If no adequate portal vein is present, the next best procedure would appear to be utilization of the superior mesenteric vein or some other large branch of the portal venous system. When an adequate shunt cannot be made between the portal and systemic venous systems, esophagogastrectomy seems to be the procedure of choice. It is best carried out through a left transthoracic approach, without immediate preliminary exploration of the abdominal cavity. The risk of operation is greater when there is active bleeding. Devascularization of the esophagus and stomach, even with vagotomy and gastrojejunostomy, offers little promise of long-continued absence of gastroesophageal bleeding. BENJAMIN GOLDMAN, M.D.

MISCELLANEOUS

Traumatic Rupture of Abdominal Viscera. ROBERT S. LAWSON. *Med. J. Australia*, 1952, 2: 396.

The author reports his experiences in the treatment of patients with traumatic rupture of abdo-

minal viscera from nonpenetrating injuries. The organs involved were as follows: the spleen alone, 11 cases; the spleen and left kidney, 2 cases; the kidney alone, 3 cases; the liver, 3 cases; the bowel, 4 cases; the bladder, 4 cases; and the membranous urethra, 4 cases.

In this series rupture of the spleen was by far the commonest major injury caused by nonpenetrating violence to the abdomen. The most difficult problem in the early diagnosis is to determine whether muscle guarding is caused by abdominal wall injury or by intraperitoneal injury. Every splenic laceration, however slight, is a sufficient reason to perform a splenectomy.

Rupture of the kidney is usually caused by a direct blow in the loin. In the author's experience, many patients with such injuries can be safely watched and will not require operation. When there is evidence of continuing bleeding, nephrectomy should be performed.

Patients with ruptured livers were treated by suture of the lacerations. When operating for a suspected liver laceration the surgeon should be prepared to use a transdiaphragmatic approach which, at times, may be required for adequate exposure of the laceration.

Rupture of the bowel can occur as the result of a nonpenetrating injury in at least two ways: firstly, from run-over accidents, especially to children, and secondly, from a sharp thrust, as from a motor bicycle handle.

Injury to the bladder or urethra should always be suspected when the pelvis has been fractured. An attempt should be made to pass a catheter. If the catheter passes easily and clear urine is obtained, all is well. If only a few drops of blood are obtained, diagnosis of a ruptured urethra is made. A small amount only of blood—stained urine or none at all, the catheter passing easily—is likely to indicate rupture of the bladder. If doubt remains, one should inject sterile water. If the water does not return in full, the diagnosis of ruptured bladder is certain.

Of utmost importance in the care of these patients is the availability of whole blood. Some of the patients treated several years ago, before blood was easily available for transfusion, died from lack of supportive care. WILLIAM T. FITTS, JR., M.D.

Experimental Study of Physical Factors, Including Fibrin Formation, Influencing the Spread of Fluids and Small Particles Within and From the Peritoneal Cavity of the Dog. HANS H. ZINSSER and ARTHUR W. PRYDE. *Ann. Surg.*, 1952, 136: 818.

Radiopaque fluids and particulate matter simulating in viscosity and specific gravity both urine and the contents of various portions of the intestinal tract, spread more rapidly when they are of low viscosity, and move under the influence of gravity in the peritoneal cavity of the dog. The results seem to indicate that spread from the lower abdomen of high specific gravity exudates—such as those from a gangrenous appendix—might be decreased by the semi-erect position.

Urine and some contents of the small bowel of low specific gravity and low viscosity will probably spread rapidly upward with vertical position and would tend to spread widely and rapidly, regardless of the position. Large bowel contents of low specific gravity but high viscosity will also tend to spread diffusely upward in the erect position, but move more slowly than small bowel contents. The leakage of the high viscosity left colon content, such as might occur from a line of operative anastomosis, is apt to be far less rapid than would be the spread of low viscosity contents of either the small intestine or the large bowel prepared by antibiotics which lower the specific gravity and viscosity of the feces.

The presence of a fresh fibrin mesh intraperitoneally appreciably slows tissue invasion and the spread of bacteria to the blood stream. This finding makes plausible the enhanced virulence of fibrinolytic strains of bacteria. Tissue invasion and explosive bacteriemia can be reduced by the presence of an excess of intraperitoneal fibrinogen or thromboplastin, whereas the spread of infection intraperitoneally is increased in dogs by the administration of heparin or dicumarol. Fibrin foam was found to be without effect. ROBERT TURELL, M.D.

GYNECOLOGY

UTERUS

Epithelial Changes in the Cervix and Their Therapy (Die Epithelveränderungen an der Portio und ihre Behandlung). WERNER CRAMER. *Muench. med. Wschr.*, 1952, 40: 2009.

In the course of 2 years the author performed 2,969 colposcopic and 312 cytologic examinations. Of 680 patients with cervical erosions, 221, or 32.5 per cent, had no subjective symptoms and no other pathologic changes in the female organs, while 89, or 13.1 per cent, had such changes but the erosion was asymptomatic. In the remaining group of 370 patients, or 54.4 per cent, the erosion was responsible for leucorrhea, a burning sensation in the vagina, dyspareunia, and pains in hypogastrium and the lumbar region.

The author is of the opinion that a benign, asymptomatic erosion should be watched but not treated, while one that causes subjective symptoms requires proper therapy.

Schiller's test should be supplemented by colposcopy and cytodiagnosis to exclude carcinoma.

To produce cure of an erosion, coexistent conditions such as infected myoma, adnexitis, or nonspecific cervicitis must be eliminated. The author performs amputation of the cervix or Sturmdorf's operation only in exceptional cases, i.e., if, for prophylactic purposes, atypical proliferation of the epithelium is present, but no signs of carcinoma are found in histologic studies.

The author admits that the customary conservative methods of treatment of the cervical erosion fail or are followed by recurrences because they do not destroy completely the epithelial layers which form glands; therefore he considers electrocautery of cervical erosion as the method of choice.

JOSEPH K. NARAT, M.D.

What is Cancer in Situ of the Cervix? Is it the Preinvasive Form of True Carcinoma? ARTHUR T. HERTIG and PAUL A. YOUNGE. *Am. J. Obst.*, 1952, 64: 807.

Carcinoma in situ of the cervix uteri is also termed intraepithelial carcinoma, preinvasive carcinoma, incipient carcinoma, and Bowen's disease of the cervix. Its relation to invasive carcinoma must be determined before its true significance will be known. The authors believe that carcinoma in situ is the preinvasive form of true cervical carcinoma.

The usual morphological characteristics of cancer may be found in carcinoma in situ. These include undifferentiation, loss of cellular polarity, numerous and atypical mitotic figures, cellular pleomorphism, and hyperchromatic nuclei. Invasion beyond the epithelium is not present.

The concept that carcinoma in situ is the beginning of an irreversible process terminating with invasive carcinoma, unless adequately treated, is based on the following observations:

1. The incidence of carcinoma in situ, although varying slightly from clinic to clinic, is within the same order of magnitude as invasive cervical cancer. Figures given are: carcinoma in situ, 0.84 per cent, and invasive carcinoma, 1.6 per cent.

2. The age incidence of carcinoma in situ is about 10 years less than that of invasive cancer. The age distribution curves are almost parallel but there is a 10 year displacement. The average age for carcinoma in situ is 38 and for invasive cancer, 48 years.

3. The sparing of Jewish women by carcinoma of the cervix is also noted in carcinoma in situ, the latter being six times more common in non-Jewish women and the former five times more common in non-Jewish than in Jewish women.

4. Forty cases of invasive carcinoma are reported in which an earlier diagnosis of carcinoma in situ was made. There was a time interval from 1 to 13 years for the change to occur.

5. Vaginal smears which are positive for cancer are found in about 75 per cent of those patients in whom a later diagnosis of carcinoma in situ is made.

6. Careful study by serial section of the entire cervix in patients with invasive carcinoma show areas at the periphery in which the malignant epithelium is confined to the surface of the cervix. This is purported to show that invasion of the neoplasm is preceded by surface or in situ involvement.

7. Spectrophotometric studies of invasive and in situ carcinoma reveal similar light-absorbing qualities.

A. L. HASKINS, M.D.

Carcinoma in Situ of the Cervix: A General Consideration. JOHN L. MCKELVEY. *Am. J. Obst.*, 1952, 64: 816.

The term carcinoma in situ is fixed in the medical mind in association with an ill-defined series of lesions which are assumed to be on the surface where one can deal with them locally. Since the problem is to determine the earliest forms of true malignancy and to protect the patient from incomplete therapy, on the one hand, or unnecessary therapy, and the established fear which goes with it, on the other, it would seem wise to drop the term carcinoma in situ as it applies to the squamous epithelial lesion of the cervix. The author does not use the term. Early carcinoma could replace it for the proved malignancies. Basal hyperplasia and inflammatory or erosion healing hyperplasia may be used for the lesions which justify these. This will focus attention upon the relatively rare atypical lesions, the vast majority of which clearly do not lead on to clinical malignancy.

The author is not prepared to accept the validity of his own diagnosis of localization of a proved carci-

noma to an individual area above the basement membrane. Lesions of the first group, which is comprised of cases in which very careful study allows a positive diagnosis of carcinoma which lies above the basement membrane only, are treated by radical therapy once the diagnosis is established. Irradiation therapy is the method of choice, although one could not too seriously object to radical surgery for this early lesion. CHARLES BARON, M.D.

The Methods of Management of Carcinoma in Situ of the Cervix. BAYARD CARTER, KENNETH CUYLER, WALTER L. THOMAS, ROBERT CREADICK, and ROBERT ALTER. *Am. J. Obst.*, 1952, 64: 833.

The purpose of this article is to give in some detail the methods used for the diagnosis, treatment, and follow-up of 126 gynecologic and 25 obstetric patients with cancer in situ of the cervix who were seen during the past 5 years.

Despite the limitations of the multiple punch-biopsy method, it cannot at present, for obvious reasons, be eliminated from clinical practice. Its use, however, must be predicated upon the knowledge that it can and will be followed by repeated cytologic studies and by cold-knife cone biopsies of the cervices in those patients who, despite negative tissue reports on punch-biopsy specimens, show epithelial atypism in cytologic smears.

The cold-knife cone biopsy, done under some form of anesthetic, is the one safe and accurate method for diagnosis in patients who show epithelial atypism in cytologic smears and doubtful punch-biopsy tissue findings.

Twenty-one of the 126 gynecologic patients with cancer in situ are being followed up with no more active therapy than the multiple punch or cold-knife cone biopsies which were done for diagnostic purposes. Two of these patients are now pregnant. Twelve of the 25 obstetric patients with cancer in situ, which was diagnosed by multiple punch biopsies or by cold-knife cone biopsies, are being followed up with no active therapy. Three of these 12 are again pregnant and are being followed up.

Radium was used in the treatment of 1 patient and radium and x-ray therapy were used in the treatment of 1 patient. Both of these patients, aged 44 and 57, respectively, had medical diseases which to them made vaginal or abdominal hysterectomy seem hazardous. These are the only 2 patients in this series who received irradiation therapy. Three patients, however, in the age group of 50 to 60 years, were treated elsewhere with x-rays alone. The authors prefer operative treatment to irradiation treatment in all age groups.

Vaginal removal of the entire cervical stumps in patients with cancers in situ of the stumps is preferable to numerous, repeated, and varied biopsies. In this series of 126 gynecologic patients, 6 cervical stumps were removed for cancer in situ. One showed microscopic foci of invasion.

Twenty patients had vaginal hysterectomies with conservation of the ovaries and 4 had vaginal hysterectomies with removal of the tubes and ovaries. The ages of the patients and the condition of the ovaries should be the main factors in determining removal of the ovaries at vaginal or at abdominal hysterectomy in all age groups. The authors have been radical in removing ovaries from the younger age groups. In the future, when hysterectomy is done, it will be a vaginal hysterectomy, whenever possible, rather than any type of abdominal hysterectomy. The vaginal hysterectomy is the safer operation for the patient and facilitates securing an adequate vaginal cuff, adequate pericervical tissues, and adequate parametrial tissues for pathologic diagnosis. Of the 24 cervices removed by vaginal hysterectomy 1 showed microscopic foci of invasion.

Eighteen patients had abdominal panhysterectomies with conservation of the ovaries and 32 had abdominal panhysterectomies with bilateral salpingo-oophorectomies. The authors were too radical in removing the ovaries in the younger age groups. Vaginal hysterectomy will replace all types of abdominal hysterectomies, including the Wertheim and the "modified" Wertheim hysterectomies, in the treatment of cancer in situ.

In this series of 126 gynecologic patients, one radical hysterectomy with radical pelvic lymphadenectomy was done because of the suspicion of microscopic foci of invasion in the biopsy specimens taken for diagnosis. Radical hysterectomy with radical pelvic lymphadenectomy is not indicated for any patient with cancer in situ.

The casualness with which obstetric patients are considered as possible candidates for cancer in situ or invasive cancer of the cervix should be deplored. These are the patients in whom restraint in arriving at a final diagnosis and in outlining definitive therapy should be followed. This group should be subjected to the same exacting diagnostic routine with clinical, cytologic, and biopsy techniques as is the gynecologic group. Performance of this exacting diagnostic routine will give surprising results. Furthermore, our knowledge of cancer in situ is so fragmentary that continued studies of the cervices of these patients before, during, and after pregnancy must be done to improve this meager knowledge.

There were 25 patients (0.47%) with cancers in situ of the cervix among 2,985 newly registered obstetric patients. Of these 25 patients, 12 are being followed up and 3 of the 12 are again pregnant. Seven patients had vaginal hysterectomies with conservation of the ovaries and 4 had abdominal panhysterectomies with conservation of the ovaries. Two patients had panhysterectomies with bilateral salpingo-oophorectomies. One of these patients, aged 44 and with 9 living children, had hypertensive cardiovascular disease. The other patient, aged 25 and with 3 living children, also had cardiovascular disease. The authors were too radical in removing the ovaries in this last patient. In general during pregnancy, conservation is neces-

sary in cancer in situ when invasive cancer has been ruled out and provided the patient will co-operate with the plan for careful follow-up studies. The authors accept the cytologic findings and the tissue diagnoses of cancer in situ during pregnancy and they continue to check the patients with cytologic and biopsy techniques during and after pregnancy to confirm the cytologic impressions and to substantiate the biopsy tissue diagnoses.

No patient died in this series. No patient has as yet developed invasive cancer.

The 7 patients with microscopic foci of invasion in the cervix form an interesting group from which it is hoped to gain valuable information as they are followed up over the years.

CHARLES BARON, M.D.

The Effect of Preoperative Radiation of Adenocarcinoma of the Endometrium. HERBERT E. SCHMITZ, CHARLES J. SMITH, and CHESTER J. GAJEWSKI. *Am. J. Obst.*, 1952, 64: 952.

Endometrial carcinoma can be destroyed in 75.67 per cent of the cases with the use of the Y applicator of Schmitz to deliver 6,000 mgm. hr. of radium within the uterine cavity, in addition to 4,000 roentgens of 800 kv. x-rays delivered to the midpelvis.

Changes in the endometrium, blood vessels, and tumor cells indicate that such therapy could retard the spread of tumor cells, if they were still present.

It was possible to salvage 86.66 per cent of the patients so treated and it was found that they had no residual tumor. CHARLES BARON, M.D.

MISCELLANEOUS

Multiple Stage Plastic Reconstruction of Anus, Posterior Vaginal Wall, Vesical Neck, and Urethra Destroyed by Bomb Fragments (Ricostruzione plastica in piu tempi dell'ano, della pareta posteriore della vagina, del collo della vescica e dell'uretra distrutti da F.A.F.) GIOVANNI BAZZOCCHI. *Arch. ital. chir.*, 1952, 75: 225.

A 24 year old woman was injured during an air raid in October, 1944. A bomb fragment penetrated the perineum and made its exit through the skin over the right half of the pubis, destroying the anterior part of the anus, a large segment of the posterior vagina, the right half of the urethra, and the entire bladder neck; the right ramus of the pubis had a comminuted fracture. These injuries resulted in a cloaca-like rectovesicovaginal fistula with complete fecal and urinary incontinence. After several months bone sequestra were expelled from the pubic region. Ten months later, in August, 1945, planned surgical treatment was begun, which required twelve separate operations over a period of 6 years.

After general supportive therapy, a large metal fragment embedded in the muscle tissue of the right thigh was removed first. Two weeks later, scar tissue was excised from the region of the bladder neck and an indwelling catheter was passed through the large fistula and secured with sutures. The sutures broke down within 2 weeks, but the fistula had considerably diminished in size.

At the next operation in June, 1941, the scar tissue obliterating the normal location of the anus was removed. The posterior three-fourths of the anal sphincter were found intact. Although the rectal mucosa could not be brought down, the area re-epithelialized over a large size rubber tube. After repeated dilatations, a functioning and continent anus was obtained. Two rectovaginal fistulas were eliminated in the next three operations in August, November, and December, 1946.

Reconstruction of the bladder neck and of the urethra required four operations which were performed in June and September, 1947, October, 1949, and April, 1950. Although the anatomical result was satisfactory, the patient had no bladder control because of the destruction of the vesical sphincter. A sling operation employing suprapubic fascial and muscle structures was not feasible because of the extensive scarring and bone destruction. Therefore, in November, 1950, a neourethra was formed, consisting of an angulated S-shaped tunnel which was joined to the external urethral orifice and made to come out near the clitoris in the left interlabial sulcus. After primary healing over a rubber catheter, urinary control was possible and micturition was accomplished by voluntary abdominal pressure.

The last operation became necessary because two small fistulas had developed in the subcuticular portion of the neourethra. A fairly large vesical calculus was also present. In September, 1951, the stone was removed through a suprapubic cystostomy and the two fistulas were closed. One of these did not heal and will have to be repaired in the near future. The functional result of the voluntary micturition, however, is unimpaired.

HERBERT TEICHNER, M.D.

Observations on Stress Incontinence of Urine. T. N. A. JEFFCOATE and HENRY ROBERTS. *Am. J. Obst.*, 1952, 64: 721.

The authors have performed cystoscopy, cystometry, and cystourethrography in 130 women. These procedures were performed in normal nulliparous and multiparous women, and women suffering from prolapse either with or without stress incontinence. In their x-ray studies, particular attention has been paid to direct lateral cystourethrography.

The most characteristic anatomical change in stress incontinence, with or without prolapse, was found to be the loss of the posterior urethrovesical angle, so that the urethra and trigone tend to come into line, the picture thus resembling closely that seen during micturition in normal subjects. The funneling of the urethrovesical junction, which has been emphasized by many workers, usually occurred in association with the disappearance of the posterior urethrovesical junction and was rarely seen as the sole or major anatomical change.

Any operation which restores the posterior angle cures incontinence even though the funneling is not corrected. In those cases in which colporrhaphy or the sling operation failed to cure incontinence, the authors found that the posterior urethral angle had not been corrected.

It is the authors' view that the posterior urethrovesical angle is a function of the intrinsic musculature of the bladder and urethra, and that it is the stretching and damage to these muscles during labor which leads to stress incontinence.

HENRY C. FALK, M.D.

The Spread of Benign and Malignant Endometrium in the Lymphatic System, with a Note on Coexisting Vascular Involvement. CARL T. JAVERT. *Am. J. Obst.*, 1952, 64: 780.

It has been observed that benign and malignant endometrium can spread to the regional lymph nodes. Pelvic lymph node metastases in endometrial adenocarcinoma is, however, considered to be a rare and late manifestation. Exact knowledge concerning the frequency and exact mode of lymphatic spread of endometrial tissue is of consequence in treating endometriosis and endometrial carcinoma. In an attempt to clarify this subject the author presents data collected at the Woman's Clinic of New York Hospital from June, 1948.

One hundred and fifty-three patients were studied. At the time of laparotomy selective or complete pelvic lymphadenectomy was performed. In 15.3 per cent of 13 patients with the diagnosis of endometriosis lymph node endometriosis was found; it was also found in 6.0 per cent of 50 patients with endometrial adenocarcinoma, in 5 per cent of 79 patients with cervical cancer, and in 14.2 per cent of 7 patients with ovarian cancer; it was not found in 4 cases of vulvar carcinoma. Of the 50 patients with endometrial carcinoma, 14 were found to have pelvic lymph node metastases. Lymph node metastases occurred twice as frequently as did ovarian metastases. Eight patients were found to have cancer emboli or thrombi in the blood vessels of the uterus and 5 had paranodal vascular involvement.

The author includes in his article a review of current knowledge concerning the lymphatic system as related to the reproductive tract, as well as a review of the literature concerned with the spread of endometrium in the pelvis. He believes that his observations support Halban's theory as to the etiology of pelvic endometriosis.

Other conclusions reached by the author include the recommendation that the best treatment for adenocarcinoma of the endometrium is radical hysterectomy and complete pelvic lymphadenectomy. The presence or absence of lymph node metastases provides a basis for prognosis far better than the histologic grade. The ultimate cure for metastatic endometrial cancer lies in the development of a substance that can be given intravenously to assist in the destruction of cancer emboli and thrombi in situ.

A. L. HASKINS, M.D.

OBSTETRICS

PREGNANCY AND ITS COMPLICATIONS

Cortisone and Pregnancy. An Experimental and Clinical Study of the Effects of Cortisone on Gestation. EDWIN J. DECOSTA and MAXWELL A. ABELMAN. *Am. J. Obst.*, 1952, 64: 746.

The authors have studied the effects of cortisone acetate on gestation in the rabbit and in the human.

Cortisone given in doses of 15 mgm. daily for varying lengths of time to rabbits weighing 3.5 to 5 kgm. was found to interfere with fertility, conception, or early embryonic development, when given before mating. Cortisone administered at different periods of gestation caused fetal degeneration, abortion, stillbirths, and neonatal deaths in up to 50 per cent of experimental animals.

The sensitivity to cortisone in the rabbit was found to increase as pregnancy progressed. It also seemed to upset the normal timing mechanism of parturition, but did not interfere with lactation.

The effects of cortisone on pregnancy in the human being were studied in 5 cases. In these cases it did not interfere with fetal development or parturition.

Various theories on the possible cause of the damaging effects of cortisone on pregnancy in the rabbit are considered. No definite conclusions could be drawn from these experiments. Although it is difficult to evaluate the effects of cortisone on human reproduction from the limited material reported, it is the author's belief that cortisone does not interfere with pregnancy in the human.

The literature on the subject is thoroughly reviewed; 113 references are included.

HENRY C. FALK, M.D.

Pre-eclampsia-Eclampsia Does Not Cause Permanent Vascular Renal Disease. WILLIAM J. DIECKMANN, R. C. SMITTER, and L. RYNKIEWICZ. *Am. J. Obst.*, 1952, 64: 850.

If all patients with toxemia of pregnancy are treated as a single group, then increasing age of the patient, increasing interval between pregnancies, as well as increasing parity, are all associated with an increasing rate of recurrence of toxemia in the next pregnancy.

The onset of hypertension, proteinuria, or edema in early pregnancy, or duration of one or more of these signs for longer than five weeks is almost always associated with a diagnosis of hypertension which carries a higher recurrence rate. The time of onset or the duration of hypertension or proteinuria has no effect on the recurrence rate in the pre-eclamptic group.

It is unwise for the patient who had toxemia of pregnancy to wait two, three, or more years for the vascular-renal system to return to normal.

The woman under 25 is less likely to have hypertensive disease than one over 25, especially if she is a primipara. If she had pre-eclampsia, the shorter the interval to the next pregnancy, the less likelihood there is for the development of essential hypertension.

Statistically, there is a real difference between the group with the diagnosis of pre-eclampsia and that with hypertensive disease in pregnancy if the recurrence of toxemia in the next pregnancy is used as a distinguishing criterion. CHARLES BARON, M.D.

LABOR AND ITS COMPLICATIONS

Delivery of Infants in a Persistent Transverse Vertex Position with Barton Forceps. GERHARD AHNQUIST. *Tr. Pacific Coast Soc. Obst.*, 1951, 19: 123.

Deep transverse arrest in the vertex presentation is one of the most difficult problems in clinical obstetrics. There are three solutions to the problem, as reflected in the resort to cesarean section; excessive and misdirected force hastily applied to "get the baby out"; and the sensible application of certain mechanical maneuvers aimed at rectifying and correcting those factors which have caused the arrest. The midpelvic arrest can occur as the result of pelvic contraction, inadequate labor forces, excessive fetal size, or abnormal fetal position. There are usually both maternal and fetal components in the development of the persistent transverse vertex presentation.

The present article is concerned with use of the Barton forceps in effecting delivery in cases of a midpelvic transverse arrest. The author devotes much space to Barton's original notes concerning the reason for the design of the instrument bearing his name. There are 11 illustrations depicting the forceps design as well as the proper application and manipulation of the forceps.

In a group of 1,782 private patients, 150 midpelvic forceps applications were necessary. Sixty-five patients of this group were delivered from a transverse arrest with Barton forceps. These constituted 3.64 per cent of the total deliveries. The other midpelvic applications were for persistent posterior presentations for which Kielland forceps were used. The cesarean section rate was 5.3 per cent.

Of the 65 patients delivered by Barton forceps, the babies were "generally large." They were incapable of being rotated manually. The chief indication for interference was lack of adequate progress in the second stage of 2 or more hours. Failure of application occurred in 1 case and forceps failure in 1; the former patient was delivered with use of the Kielland forceps, the latter by cesarean section. There was no maternal mortality. The fetal mortality was 1.5 per cent. The incidence of soft tissue trauma attributable to the forceps was 6.2 per cent and the incidence of hemorrhage due to forceps was 3 per cent. The puerperal morbidity was 1.5 per cent.

In conclusion, it is the author's opinion that the Barton forceps, because of their unique design, are most adaptable to delivery from the persistent transverse vertex in midpelvis. A. L. HASKINS, M.D.

PUERPERIUM AND ITS COMPLICATIONS

Periodic Temperature Elevations of the Normal Puerperium (Clochers et dépressions thermiques périodiques de l'accouchée normale). J. BADIN and J. CHOUKROUN. *Sem. hôp. Paris*, 1952, 28: 3016.

A statistical study of the temperature variations in the first 3 weeks of the normal puerperium gives evidence that the temperature fluctuations are not the same each day. The probable days on which the temperature elevation is greatest are the third, sixth, ninth, thirteenth, and seventeenth days after delivery. The probability of a temperature depression is greatest on the fifth, seventh, fifteenth and eighteenth days. The authors connect this periodicity with a postpartum syndrome of adaptation. They believe that postpartum complications are influenced by the periodicity, and always occur on the critical days when elevation of the temperature occurs. The temperature rhythm of the patient expresses the unevenness of thyroid function as that gland attempts to meet the excessive demands.

JAMES HENRY FERGUSON, M.D.

NEWBORN

Peritonitis of the Fetus and Newborn (Le peritoniti del feto e del neonato). CAMILLO UNGARI and ARTURO VALIANI. *Clin. Ostet.*, 1952, 54: 147.

Two instances of peritonitis of the newborn infant are reported. One occurred in a full term male child and the other in a premature female. Both were born spontaneously and there was no evidence of trauma to mother or child.

In the full term child there was no evidence of abnormality for the first 19 hours after birth; the child assumed the mother's breast and passed urine and meconium. Nineteen hours later the infant began to cry, refused the breast, and evidenced a serious toxic state which became progressively worse until death occurred a few hours later.

Autopsy disclosed a "meconial" peritonitis which was caused by a perforation in the fundus of Meckel's diverticulum. The walls of the diverticulum were markedly thickened and histological examination revealed a variety of heterotopic tissues (testicular, epididymal, cartilaginous, and what appeared to be endometrial glandular tissue) which suggested the diagnosis of a teratoma. Here the etiology suggested by the author would be that of heterotopic gastric mucosal tissue in the teratoma of which the succus would exert a digestive action in the wall of the diverticulum sufficient to produce ulceration or even the perforation itself.

In the premature child the symptoms of peritonitis appeared a few hours after birth and were quite similar in kind and in their course to those of the here reported full term child. The peritoneal cavity was aspirated and the exudate found to be sterile. Death occurred 30 hours from the time of birth.

Autopsy disclosed a sterile peritonitis resulting from a perforation in the fundus of the stomach. There was present a stenosis of the duodenum at the point of transition from the first to the second portion (superior flexure), and the stomach and first portion of the duodenum was enormously distended.

The author ascribes the cause of the stenosis to an arrested development of the secondary occlusion by epithelial proliferation (embryonal atresia of Tandler), which should reopen by recanalization at about the sixtieth day of intrauterine life. It is suggested that the cause of the perforation in the gastric fundus might result from the effects of the unnatural distention. Talma has shown in the rabbit that simple over-distention of the stomach may produce hemorrhages into the gastric mucosa with consequent malacia, necrosis, and perforation.

Although the author has reported these instances because of their unusual aspects, that is, because of the fact that they differ from the usual and also from each other, nevertheless he thinks that they reveal something, at least they seem to show that treatment at the earliest period is essential if there is to be any hope of saving the life of the child.

JOHN W. BRENNAN, M.D.

An Investigation into the Occurrence of Perinatal Subdural Hematoma; Its Diagnosis and Treatment. MATTI SULAMAA and PAAVO VARA. *Acta obst. gyn. scand.*, 1952, 31: 400.

In a study of autopsy reports from the Women's and Children's Clinic of the University of Helsinki, 178 cases of subdural hematoma were found. The lesion is defined as all collections of blood accumulating between the dura and the surface of the brain. Sometimes there is a more complicated lesion of which a subdural hematoma is only a part. The incidence of subdural hematoma after full-term delivery is at least 0.31 per cent; this figure increases considerably if premature deliveries are included.

The etiologic factors were found to be prematurity, late toxemia of pregnancy, disproportion between the head and pelvis, and surgical delivery. Symptoms such as drowsiness, lack of tone, and other conditions are in no way characteristic and therefore the possibility of the presence of a subdural hematoma is often disregarded in premature babies, or in cases of icterus and labored respirations.

The best diagnostic procedure is an exploratory puncture performed in time, and with use of the correct technique. The problem in the newborn infant is different than it is in adults; because of the open cranial sutures and the elasticity of the head in the newborn, a fatal increase in intracranial pressure may not occur, and therefore all infants do not die. The acute and subacute forms of subdural hematoma are fatal in most cases; however, those that develop less rapidly may be treated surgically. The principles of surgical treatment are a gradual emptying by

means of a puncture at any early stage and by the removal of the hematoma membranes later, should such membranes develop. HARRY FIELDS, M.D.

MISCELLANEOUS

Reflections on Physiologic Birth Mechanisms (Uberlegungen zum physiologischen geburtsmechanismus). H. EYMER. *Geburtsh. & Frauenh.*, 1952, 12: 769.

The author writes from the University of Munich's Women's Clinic and reviews the various observations made in the literature on the mechanism of normal birth. The first observations date from Siegemundin, in 1690, who stated that the head enters the pelvis obliquely. Following this came the concept of engagement and then the idea of pelvic mensuration. Smellie, exactly 200 years ago (1752), laid the groundwork for present beliefs on birth mechanism based on flexion, rotation, and descent. From him comes the term "conjugate diameter." Various men left their names attached to obstetric history, as: Ritgen's maneuver, Mueller's method of pelvic impression, Roederer's obliquity, Hodge's planes, Baudelocque's diameter, Naegele's obliquity, Litzmann's obliquity, and others.

In spite of the progress made, there are many unknown factors. If one could have hindsight as well as foresight, the problem would be easier. Especially is this so with the problem of the aftercoming head. The author makes little mention of x-ray investigative methods. WARREN R. LANG, M.D.

Obstetric Trauma Causing Separation of the Proximal Epiphysis of the Tibia (Il distacco epifisario ostetrico dell 'estremita prossimale della tibia). A. ZANINI and L. PARENZAN. *Ann. ostet. gin.*, 1952, 74: 173.

Epiphysial separation due to birth injury is of infrequent occurrence, and usually affects the humerus and the femur. Involvement of the tibia is rare and separation of the proximal epiphysis of the tibia has been reported in the literature only once (M. J. ISERPYT, *Acta Orthop, Belgica*, 1946, 12:37). The authors observed 2 such cases of trauma in short succession.

The first patient was a female infant weighing 2,430 gm., delivered by cesarean section for fetopelvic disproportion. On the second day the left leg was swollen, particularly about the knee which appeared tender and was held in fixed semiflexion. While flexion and extension of the knee joint were not possible, lateral movements of adduction and abduction showed an abnormal range and a soft crepitation could be perceived. X-ray examination revealed medial and posterior displacement of the tibia. After keeping the leg in traction for 16 days, active and passive movements were normal. At the age of 13½ months, the infant walked normally and roentgenograms showed only slight residual valgus of the left knee.

The second patient was a male infant weighing 3,050 gm., delivered by podalic version and extraction. The left knee was edematous, tender, and held immobilized. Passive flexion and extension could not be performed while abnormal lateral motion and a soft crepitation were present. X-ray films revealed medial and posterior displacement of the tibia. After 4 weeks of traction, the knee was still somewhat tender and there was an increase of lateral mobility. Ambulation began at the age of 13 months and the only abnormal feature at that time was found to be a slight S-shaped curvature of the left tibia.

The diagnosis of this condition is based on the combination of a clinical picture of fracture plus x-ray evidence of an apparent dislocation. The anatomical and functional prognosis in both of these cases appeared to be good.

HERBERT TEICHNER, M.D.

GENITOURINARY SURGERY

ADRENAL, KIDNEY, AND URETER

Cushing's Syndrome. E. F. Poutasse and E. P. McCullagh. *J. Urol.*, Balt., 1952, 68: 779.

Cushing's syndrome is more common in women than in men. It is usually characterized by a "moon face," a short obese neck, a "buffalo" hump of fat in the cervicodorsal region, protuberance of the abdomen, muscular weakness and wasting of the extremities, and purplish straie over the upper thigh and abdomen. Easy bruising of the skin is common. Acne and hirsutism may be pronounced. Menstrual irregularity in women and decreased libido and potency in men are common. Hypertension, insulin-resistant diabetes mellitus, and osteoporosis usually are present. Lymphopenia and eosinopenia with increased hemoglobin and red cell counts also occur. Electrolyte imbalances may develop.

Cushing's syndrome is the result of hyperadrenocorticism. The term "Cushing's disease" is restricted to cases of the syndrome associated with a basophilic adenoma of the pituitary gland. The changes characteristic of Cushing's syndrome are probably the result of hypersecretion of adrenal 11-oxysteroids. Whether the primary pathological change in these cases lies in the adrenals or the pituitary gland is as yet not decided. It seems certain that in some instances pituitary adenomas may result in the changes characteristic of Cushing's syndrome. If a pituitary adenoma is present, pituitary irradiation may be successful in producing a remission of the disease.

On the other hand, adrenal hyperplasia, benign adrenal tumors, and malignant adrenal tumors without gross pituitary involvement are associated with the production of the syndrome. Among 22 cases studied by the authors, 16 patients were found to have bilateral adrenal hyperplasia. Excretory urography, translumbar aortography, posterior laminograms, and perirenal air insufflation occasionally aid in determining the presence and location of an adrenal tumor. In a large series of cases, the average level of urinary 17-ketosteroids varied considerably with the type of adrenal pathology; the average level was 5.7 for benign tumors, 18.1 for adrenal hyperplasia, and 124.4 mgm. per 24 hours for malignant tumors. In cases in which an adrenal tumor is localized, the authors suggest its removal by the thoracoabdominal or flank approach without exploration of the other adrenal gland. If there is no localizable tumor, the authors prefer simultaneous exposure of both adrenals through bilateral posterovertical incisions. If adrenal hyperplasia is present, about four-fifths of one gland is removed. The other gland is removed in toto either at the first operation or shortly thereafter. Surgical removal of functioning adrenocortical tumors or subtotal adrenalectomy for bilateral hyperplasia usually results in remission of the syndrome.

All patients with Cushing's syndrome subjected to exploration should be given cortisone in intramuscular doses of 25 to 100 mgm. or oral doses every 6 hours for 24 hours prior to operation. After partial resection of one gland and total removal of the other, cortisone must be administered postoperatively and withdrawn gradually. John T. Grayhack, M.D.

Pheochromocytoma with Fatal Myocardial Infarction in a Man Aged 22. W. M. Priest. *Brit. M. J.*, 1952, 2: 856.

The author presents the case of a patient who had suffered severe headaches for 2 years. While playing cricket he collapsed, with burning substernal pain, and died abruptly 10 days after the collapse. There was a past history of sick headaches in adolescence and 2 years prior to death the headaches became more frequent and severe. He was examined for this complaint, approximately 4 years prior, and found to have a hypertension which varied between 160 and 240 systolic and 120 and 160 diastolic. He was studied at this time and renal function was not impaired; the heart was not obviously enlarged. Intravenous tetraethylammonium bromide, 500 mgm., produced a rise in blood pressure from 184/138 to 240/184, reverting to the previous level in 11 minutes; there was no rise in skin temperature of the legs. Amytal-depression and cold-pressor tests gave no significant response. The patient was considered unsuitable for lumbodorsal sympathectomy and was discharged.

One year later the patient began to have profuse sweats, having suffered from headaches approximately once a week during the interim. One year later some cardiac enlargement was noted, a mitral murmur, systolic in time, and a blood pressure on one occasion of 170/150. He remained active, however, until his final illness. Post-mortem examination revealed a recent infarction of the posterior wall of the left ventricle and a tumor of the left adrenal weighing 20 gm.

In this patient the headaches led to investigation and discovery of the hypertension, at which time there was nothing too suggestive of adrenal tumor save absence of response to depression and cold-pressor tests and rise in blood pressure with T.E.A.B.

The first symptom really suggestive of an adrenal medullary tumor, namely, profuse sweating, appeared a year after the hospital investigations had been done and were associated by the patient with exertion. For this reason, no special attention was paid to it. The symptoms as known before death were compatible with essential hypertension, which is presumed to have caused the coronary occlusion.

Several authorities have recently emphasized that all young and middle-aged hypertensive subjects should be investigated with adrenal tumor in mind.

The remarkable feature of this case is that there was little evidence of cardiac involvement before the fatal coronary occlusion and the patient had followed a normal working life, including games, up to that time. ROBERT O. BEADLES, M.D.

Retrocaval Ureter. Report of a Case and a Review of the Literature. BENJAMIN S. ABESHOUSE and LOUIS H. TANKIN. *Am. J. Surg.*, 1952, 84: 383.

The authors state that retrocaval ureter is a rare congenital anomaly resulting from maldevelopment of the inferior vena cava and/or its venous vascular components. The anomaly of the vena cava is responsible for the ureter taking an abnormal course, passing behind the vena cava, partially encircling the vessel, and then passing ventral to the vessel to reach the bladder instead of assuming its normal position lateral to the vena cava. This anomaly is also described as circumcaval, postcaval or deflected ureter, or preureteric vena cava.

From a review of 57 reported cases and the study of 1 personal case, the authors arrived at the following conclusions: (1) retrocaval ureter is a rare anatomic and clinical entity whose incidence appears to be greater than reports indicate. Familiarity with the condition on the part of urologists and radiologists will undoubtedly result in the diagnosis of many more cases; (2) the diagnosis is made from characteristic roentgenographic findings with opaque catheters and ureteropyelograms in the anteroposterior, oblique, and stereoscopic positions; (3) venography may prove of value in establishing the anatomic relations of the anomalous ureter and venous systems and in determining the type of surgical treatment; (4) asymptomatic cases with no roentgenographic demonstration of severe obstructive changes in the upper ureter and pelvis require no surgical treatment but should be examined roentgenographically at intervals of 6 to 12 months; (5) nephrectomy should be restricted to those cases presenting irreparable damage in the affected kidney, and conservative operations should be employed when the ureter and pelvis show a relatively minor degree of dilatation; (6) conservative operations should aim to restore the normal anatomic relations of the ureter and may be accomplished by a plastic operation on the ureter, such as section and reanastomosis of the ureter, preferably above the ureteropelvic junction, or by section (and reanastomosis if possible) of the vena cava; and (7) the final choice of operation must be made at operation after careful examination of the anomalous ureter and vena cava. ROBERT TURELL, M.D.

GENITAL ORGANS

Contributions to Prostatic Surgery (Beitraege zur Prostatachirurgie). GERHARD-WILHELM HEISE. *Zschr. Urol.*, 1952, 45: 368.

The article is divided into four parts: (1) a review of renal disturbances in respect to acidosis, (2) a report of the effect of alkalinization on renal disturbance and acidosis, (3) a report of the operative approach used in 112 prostatectomies, and (4) a report of the operative results.

The following tests are carried out routinely: (a) concentration-dilution test, (b) nonprotein nitrogen, (c) residual urine, (d) cystoscopy, (e) rectal examination, (f) consideration of the general condition—cardiovascular and pulmonary, and (g) infection of the genitourinary tract.

Back pressure leads to tubular damage with persisting glomerular function. Clinically this appears as polyuria, accompanied by polydipsia, fixed hyposthenuria, i.e., isosthenuria, lack of ammonia formation and excretion, increased elimination of sodium, lack of acid-alkali regulation, excretion of exclusively alkaline urine, and eventual acidosis. When, finally, the kidney loses the ability to produce urine at all, true uremia develops. Uremic coma has been the subject of surgical and internal medical therapeutic efforts. Since acidosis and uremia are closely related, correction of the acidosis was attempted by the application of sodium bicarbonate and has become quite popular. It is estimated that from one-third to two-thirds of prostatic patients suffer from acidosis.

Five patients with prostatectomies were given 3.0 gm. of sodium bicarbonate (in substance) 2 to 3 times a day by mouth for a duration of 10 days preoperatively and postoperatively and a reduction of the nonprotein nitrogen was noted. Encouraged by this experience, another 15 operatively, and 5 conservatively, treated patients were given 1,000 c.c. of an isotonic 1.3 per cent solution of sodium bicarbonate per rectum and again a reduction of nonprotein nitrogen could be noted. Thereafter, 48 patients whose nonprotein nitrogen exceeded 40 mgm. per cent were prophylactically alkalinized and the carbon dioxide-combining power of their plasma was determined with Van Slyke's method. The grading of Palmer and Van Slyke was used. With greater than 55 volume per cent there was no acidosis; with 55 to 40 volume per cent there was slight acidosis; with 40 to 30 volume per cent, moderate acidosis; with below 30 volume per cent, severe acidosis. The 48 patients were divided into three groups. Group 1 consisted of 12 patients who received 1,000 c.c. of 1.3 per cent solution of sodium bicarbonate by Murphy drip for 4 days. Group 2 consisted of 12 patients who received an intravenous injection of a 20 per cent solution of sodium acetate twice daily for 4 days. Group 3 consisted of 24 patients who received 13.0 gm. of sodium bicarbonate (in substance) given by mouth on an empty stomach for 4 days.

The results were as follows: in groups 1 and 2 there were equivocal effects; improvement and also regression were noted. In group 3 there were unequivocal good effects with improvement of the carbon dioxide-combining power and reduction of the nonprotein nitrogen values. Among the total of 48 patients, 30, or two-thirds, suffered from latent acidosis as detected in the course of this investigation. The value of alkalinization is demonstrated by the postoperative mortality figures of three

6 month periods: 1950 (last half)—no alkalinization in 39 patients and 4 deaths from urosepsis; 1951 (first half)—partial but not systematic alkalinization in 35 patients and 2 deaths from urosepsis; 1951 (second half)—systematic alkalinization in 38 patients and no deaths. It was also observed that with this therapy concentration of the urine below 15 points was no absolute contraindication to surgery. Gastric disturbance, anorexia, and mental apathy disappeared. Therefore, prophylactic alkalinization combined with improved operative technique and the administration of antibiotics and sulfonamides achieved favorable results.

Within the last 1½ years 264 patients with lesions of the prostate were observed, 112 of whom (42.7%) were treated surgically. Among these, 76 (67.9%) had retropubic, 16 (14.3%) ischiorectal, 4 (3.5%) perineal, and 16 (14.3%) had transurethral operations. Transvesical operations were not performed because the author believes that detrusor disturbances are added to sphincter damage. After 3 of the first 20 patients operated on with Millin's technique had developed necrosis of the prostatic capsule, the capsule was incised longitudinally (according to Ward) in the remaining 56 patients. This has the advantage of less hemorrhage, easier dissection of the adenoma, good exposure of the vesical neck, and easier suture of the capsule in two layers. The ischiorectal approach modified by Henning was used, but here, too, the capsular incision was longitudinal instead of horizontal, with reconstruction in two layers. Manipulation such as suture ligature at the vesical neck was kept at the minimum in order to decrease the hazard of incontinence, except when hemorrhage made it necessary. Extracapsular drainage was used in both procedures. Wound infection was observed with the retropubic but not with the ischiorectal method. No wedge excisions of the mucosa were performed with either method. The indwelling catheter remained in place for 8 to 10 days. Plugging of the catheter was treated by irrigation with 30 to 40 c.c. of a 3.8 per cent solution of sodium citrate. The retropubic method was chosen for slender patients in good general condition and with a narrow interspace between the ischial tuberosities. The ischiorectal method was applied in poor cardiovascular risks. Bronchopneumonic complications were observed in 5 of 20 retropubically treated patients but in none of the 16 ischiorectally operated patients. All patients received sacral anesthesia with 30 c.c. of 1 per cent solution of novocain and in the retropubic operations the abdominal wall was anesthetized also. Transurethral resections were reserved for patients with small, fibrous glands, medium bars, and carcinomas. Among 264 patients observed during the last 18 months, 21 with carcinoma were found. Of 6 operatively treated patients with carcinoma, 3 died; and of 15 conservatively managed, 2 died.

Of 264 patients, 25 (9.4%) died; 152 were treated conservatively with 14 (9.2%) deaths, and 112 were treated operatively with 11 (9.8%) deaths; 76 underwent retropubic surgery with 9 deaths, 16 underwent transurethral resection with 1 death, and 4 underwent perineal operation with no deaths. In the beginning the mortality was high, especially following retropubic surgery. In the first series of 34 patients, 7 died; urosepsis, embolism, and blood transfusion accidents were the causes of death. In the second series of 35 patients, 4 died from central pneumonia, urosepsis, and carcinomatous metastases. None of the 38 patients of the third series died. The decline of urosepsis was especially important. The improvement of the mortality figure was not associated with a more careful selection of patients as the percentage of operatively treated patients was high (42.7%). In the last series of patients, 38 of a total of 85 were subjected to surgery. The ages ranged from 42 to 78 years. The preoperative preparatory period was shortened to 3 weeks because of the alkalinization. The postoperative period averaged 3 weeks also. The discharge of a patient on the tenth postoperative day is in the author's opinion a "heroic" risk inasmuch as recurrence of infection may occur after 2 weeks. In addition to improved technique and antibiotics, the treatment of nephrogenic acidosis is deemed responsible by the author for the improved operative results.

ERNEST BORS, M.D.

A Histological Explanation for the Beneficial Action of Endocrine Therapy in Carcinoma of the Prostate. T. NICOL, I. D. HELMY, and A. ABOU-ZIKRY. *Brit. J. Surg.*, 1952, 40: 166.

The authors review the literature on the effects of castration in prostatic carcinoma. They review some of the animal experiments dealing with this subject. They state that although beneficial action of estrogen treatment in prostatic carcinoma is due to the fibrosis produced, no definite explanation has been found for the manner in which the response of the affected tissue is brought about. They review the literature in which proof is given that the estrogenic hormone does not prove to have a mitotic poisoning action on the malignant cells in vivo or in vitro. As the reticuloendothelial system in the defense against cancer in general has been referred to by many workers, the estrogenic hormones plus castration are considered to have an effect on prostatic cancer. The authors state that since fibrosis always accompanies the beneficial action of estrogen and castration treatment of carcinoma of the prostate, since the reticuloendothelial system plays an important role against cancer, and since the genetic relations between the reticuloendothelial cells and fibroblasts are well known, they thought it worth while for them to study the effects of estrogens on the reticuloendothelial system and to ascertain whether or not the reticuloendothelial cells take part in the development of the prostatic fibrosis.

They carried out experiments on guinea pigs which were divided into groups of intact males and orchiectomized and ovariectomized animals. A month was allowed to elapse after orchectomy and

ovariectomy to insure complete recovery from the operation and the disappearance of testicular or ovarian hormones from the blood. The animals received a daily subcutaneous dose of trypan blue for 6 days and were killed with chloroform the following day. The estrogens used were estradiol benzoate, estrone, stilbestrol dipropionate, and dienestrol. Some were given the substances by mouth, but most of them received them by intramuscular injection. The daily dose varied from 0.1 to 5 mgm. Specimens were taken from the spleen, liver, lymph nodes, bone marrow, skin and subcutaneous tissues, adrenal glands, and from the prostate or the uterine horns. After fixation in Heidenhain's "Susa" fluid, sections were cut 10 μ thick and stained with dilute carbol-fuchsin or weak eosin. The activity of the reticuloendothelial system in the organs studied was measured by the number of dye-bearing cells and the intensity of the vital staining.

Their results suggested that estrogenic treatment, especially when combined with orchectomy, assists mobilization of the reticuloendothelial cells from the organs into the circulation. In the spleen and in the liver the reticuloendothelial system was represented by the specialized phagocytic cells of Kupffer. In the lymph nodes the same pattern reaction was produced by estrogens. The number of dye-bearing cells, particularly in the sinuses of the medulla, progressively increased and the response was more intense in the hormone-treated orchiectomized animals.

The prostate in the intact animals not given hormones contained only a few dye-bearing cells in the loose areolar tissue between the acini, which were surrounded only by a thin fibrous layer. After estrogenic treatment the dye-bearing macrophages progressively increased in number and the layer of fibrous tissue around the acini increased in thickness, especially in the animals which received injections of hormone for 3 or 4 weeks. Orchectomy by itself seems to have a similar effect on the prostate, for in the orchiectomized animals not given hormone both the number of macrophages and the degree of fibrosis were greater than in the intact contact controls. With estrogen treatment, prostatic fibrosis in the orchiectomized animals was accelerated until, after injections of estradiol benzoate for 4 weeks, the spaces between the acini were practically obliterated by dense fibrous tissue.

In the female animals the reticuloendothelial system was also activated by estrogens. Stimulation of the macrophages in the spleen, liver, and lymph nodes, and mobilization of the cells into the circulation occurred as in the males. An intensified reaction could be obtained by giving a large daily dose of estrogen (up to 5 mgm.) for 6 days instead of a small daily dose (0.5 mgm.) for 4 weeks.

Estrogens also appeared to act on the secondary sex organs in the female in a manner comparable to their effects on the prostate in the males.

The authors conclude that the findings and experiments in both the male and female animals indicate that estrogens possess a strong stimulating influence on the reticuloendothelial system which results in the appearance of large numbers of macrophages in the spleen, liver, and lymph nodes, and in the mobilization of these macrophages into the circulation. The reticuloendothelial system is apparently intimately related to the secondary sex organs, since it was found that, together with the liberation of the cells from the reticuloendothelial organs, many macrophages appeared in the uterine horn of the female and in the prostate in the male.

The author's research indicates that the activity of the macrophages should be stimulated when malignant tumors are present and that this can be done by the use of estrogens, under whose influence the tissues, particularly those of the reproductive systems, are provided with numerous macrophages. The fibromatogenic effects of continuous and prolonged estrogenic treatment, the known genetic relationships between the macrophages and fibroblasts, and the present findings all point to the probable transformation of macrophages after prolonged estrogenic treatment into fibroblasts and later into fibrous tissue. This would appear to be the manner in which the beneficial sclerosis occurs in cases of carcinoma of the prostate after endocrine therapy. This study also showed that orchectomy stimulated the macrophages, that the stimulation and mobilization of the cells was accelerated by the combination of orchectomy and estrogenic treatment, and that this research points to the desirability of finding a substance allied to estrogen which possesses a still more powerful stimulating effect on the reticuloendothelial system without the possible ill effects of estrogen. PAUL R. LEBERMAN, M D.

MISCELLANEOUS

Hypertension with Unilateral Kidney Disease; Experiment, Clinical Findings, and Practical Conclusions (Ueber den Hochdruck bei einseitiger Nierenerkrankungen; Experiment, Kasuistik und praktische Folgerungen). H. BOEMINGHAUS and F. J. GOETZEN. *Zschr. Urol.*, 1952, 45: 472.

The present study is divided into two parts: (1) a review of experimental research of the world literature, and (2) a review of clinical data. Exhaustive references are quoted which cannot be reviewed in detail. In the introduction, the authors stress the point that hypertension due to a unilateral kidney disease is an accepted fact, but that one cannot predict the result after nephrectomy.

Experimental data. In 1880 Lewinsky produced cardiac hypertrophy within a few weeks' time by constriction of a renal artery. In 1905 Katzenstein observed a short-lived hypertension by a loose constriction of the renal artery. In 1909 Alwens achieved a slight hypertension by compressing the kidney in an onkometer. In 1929 Hartwich (Volhard) noted hypertension following bilateral ligation of the ureter and following constriction of the renal artery with small silver rings. In 1933 Loesch reported perma-

nent hypertension resulting from intermittent compression of the kidney pedicle. In 1934 Goldblatt invented his specially built clamp for constriction of the renal artery which led to permanent hypertension with values of 200 mm. Hg, and proved that the time factor is essential for reversibility of the phenomenon. Others have shown that hypertension can be obtained also by constricting the entire kidney with cellophane or rubber. Constriction of the aorta above the renal vessels has a similar effect if there is functional renal tissue below the constriction.

All experiments indicate that the presence of renal ischemia is essential for the development of hypertension. Constriction of renal veins led also to hypertension. Complete ligation of the ureter causes an increase of intrapelvic pressure which in turn causes renal ischemia and subsequently hypertension. Slow constriction of the ureter fails to produce this effect. Intrinsic obstruction of renal arteries by various means produced contradictory results. Bilateral nephrectomy in 1 of 6 parabiotically united rats led to hypertension in all. In bilaterally nephrectomized dogs, kept alive with the artificial kidney, hypertension developed with vascular changes comparable to those found in human malignant hypertension. Partial destruction of kidney tissue by mechanical, thermic, chemical, or roentgenologic methods may lead to hypertension. Hypertension as caused by renal ischemia cannot be produced by ischemia of other organs. Operations on the sympathetic nerves (sympathectomy of the renal pedicle, total bilateral sympathectomy) or spinal cord (anterior rhizotomy from T-6 to L-2, transection of the spinal cord) do not abolish experimental hypertension. Ischemic renal hypertension can be produced also in autogenous transplants of the kidney (to the neck or leg) when the nutrient vessels (carotid or femoral) are constricted. The pituitary and adrenal glands do not influence hypertension, which is therefore independent of vasomotor reflexes and endocrine activity.

In 1898 Tigerstedt and Bergmann isolated "renin" from the renal cortex. With the successful production of ischemic renal hypertension the renin problem became the focus of interest for many experimental and chemical investigations. The result of these contributions is that pressor substances cause hypertension by means of humoral mediation and it is thought that ischemic or hypoxic metabolic changes of the kidney are responsible for the initial development of the pressor substances inasmuch as the condition is reversible by early restoration of adequate circulation. Many authors believe that the pressor substance is formed in the cells of the muscular layer of the arterioles which (in the dog and rabbit) have secretory granules and resemble chromophile cells of the anterior lobe of the pituitary. With renal ischemia these cells become hyperplastic, which is identical with the hyperplasia of the juxtaglomerular apparatus observed 24 hours after constriction of the renal artery.

Goldblatt is opposed to the theory that renin forms in the juxtaglomerular apparatus because it is present in the pig embryo although such juxtaglomerular apparatus is absent. While the ischemic renal hypertension can be explained by an enzymatic theory, human hypertension cannot. Pressor substances are found most frequently with acute hemorrhagic nephritis but rarely, if ever, with chronic nephritis. It seems possible that renin initiates hypertension which is later maintained by other, yet unknown, pressor substances. Removal of the ischemic kidney several months after onset of hypertension fails to correct the hypertension. While renin or pressor substances are not sympathicomimetic substances, renal ischemic hypertension will respond in its later stages to sympathicolytic drugs. Goldblatt believes that the benign and malignant human hypertension can be imitated experimentally. Malignant hypertension can thus be produced by (1) severe constriction of the renal artery with later removal of the healthy kidney, (2) unilateral nephrectomy with constriction of the remaining kidney, (3) severe constriction of both renal arteries, and (4) constriction of the aorta above the renal arteries. The clinical and pathologicoanatomic difference between benign and malignant hypertension can also be duplicated experimentally. These changes involve the capillaries and arterioles, and are believed by Goldblatt to originate from a combination of hypertension and a toxic agent. The physical effect of hypertension per se is deemed responsible for the pathologicoanatomic changes, according to Laas.

Clinical data. Goldblatt believes the essential hypertension to be of renal origin; however, many American investigators could not prove circulatory disturbances with essential hypertension. Fundus examinations permit a clinical differentiation between a "red" and "pale" hypertension. In experimental studies, copper wire arteries were observed to form within the first few months after renal ischemia only to convert into the retinitis angiospastica with silver wire arteries after one year, i.e., the funduscopic findings changed from the "red" to the "pale" characteristics of hypertension. Animal experimentation suggested, on the basis of these findings, a similarity of the benign phase of renal hypertension and essential hypertension.

Two schools of thought are quoted: one is the belief that the percentage of urologic disease preceding or accompanying essential hypertension is high—the other, that it is low. That urologic disease may be the cause of hypertension is frequently mentioned in the literature since Cohnheim reported his case in 1877. Different classifications have been proposed by Bowen, Nesbit and Ratliff, and Linder to demonstrate which pathologic changes of the genitourinary tract may be responsible for hypertension, and they range from occlusion of the renal artery all the way down to phimosis. Numerous cases from the world literature are quoted to illustrate some aspects of these classifications—especially processes leading to intrinsic (atherosclerotic plagues, aneurysms) or extrinsic (kinking due to ptosis, perinephritis, hydronephrosis, extrarenal tumors, pyelonephritic atro-

phy, renal hypoplasia) interference with renal circulation are mentioned. In contradistinction, renal tuberculosis is rarely responsible for hypertension but, rather, is connected with hypotension. Pertinent references are quoted. Cases of hypertension accompanying renal tumors have been reported. Some authors ascribe it not to the compressing ischemia effect of extrinsic pressure through tumor expansion, but rather to a special endocrine activity of the tumor.

The authors have reviewed the cases of 34 patients with renal carcinoma, only 4 of whom had a hypertension. Wilms tumors, however, may have an endocrinelike effect in creating hypertension. Polycystic renal degeneration is frequently linked with hypertension, although hypertension does not necessarily accompany this condition. Good results from nephrectomy with regard to hypertension were observed when, in rare instances, the disease was unilateral. Hypertension in conjunction with echinococcal cysts and also with renal trauma was reported. Ligation of aberrant vessels may cause transitory or persistent hypertension. It is believed that resection of the infarct may prevent a later hypertension. Hypertension was observed in cases of calculosis with or without hydronephrosis or pyonephrosis. Theories are proposed as to why the majority of hydronephroses is not combined with hypertension, such as, that the intact kidney exerts a depressor action or that the pressor substances are absent owing to destruction of their formative cells in the tubular part of the kidney. Cases of hypertension are reported in connection with bilateral involvement of the urinary pathways, be it obstruction from intrinsic or extrinsic causes. The authors believe, with Linder, that hypertension with hypertrophy of the prostate is caused by some condition other than prostatic disease. Hypertension from urethral stricture or phimosis is extremely rare, yet was reported.

Although hypertension caused by renal ischemia of unilateral kidney disease has been proved by all the mentioned facts, it remains unknown why it is still relatively rare (considering the great number of patients who are treated for various unilateral kidney conditions without ever showing hypertension). This rarity is believed to be due to the neutralizing effect of the normal contralateral kidney which produces an antipressor substance that experimentally shows vasodilator properties. Antipressor substances are present in protein-free renal extracts, and a hypotensive effect was observed in association with artificial abscesses or the injection of typhus vaccine. Antirenin could be produced in rabbits against dog renin, and in dogs against pig renin. Goldblatt succeeded, experimentally, in controlling ischemic hypertension with antirenin. As long as the output of antipressor substances from the normal kidney is sufficient, hypertension will not develop as the result of unilateral kidney disease. However, this theory receives a setback when it is considered that hypertension does not of necessity develop from bilateral kidney disease such as pyelonephritis. An unequivocal explanation, therefore, cannot be given as to why the majority of patients with unilateral kidney disease do not suffer from hypertension.

Some experiments seem to indicate that hypertensinogen, produced in the liver, decreases with liver insufficiency. Collateral circulation between the kidney and surrounding tissues was tested experimentally with respect to hypertension and was found to play an important role in the prevention of hypertension. Nesbit and Ratliff believe this to be true also in man. This role of the collateral circulation may explain why hypertension develops in some cases but not in others. However, re-exploration of decapsulated kidneys failed to show a newly formed collateral system. Individual differences of the reactivity of the vascular system may be one of the causes why hypertension is present in some cases, but absent in others. The following conditions should exist, according to Sensenbach, before nephrectomy is indicated: (1) the function of the affected kidney must be impaired, (2) the function of the contralateral kidney must be normal, (3) hypertension must be of short duration, and (4) the chances are best in young people.

Various authors report their results following nephrectomies for hypertension caused by unilateral kidney disease; the figures of their success range from 20 to 50 per cent.

Conclusions. The mechanism of experimental ischemic hypertension is not yet understood. The time factor is important and a hypertension of long standing is not reversible by nephrectomy, probably due to vascular changes in the nonaffected kidney caused by the hypertension. Clinically observed hypertension is associated with unilateral kidney disease, most frequently with pyelonephritic atrophy. The difference between experimental and clinical observation is that hypertension in man is not always associated with unilateral kidney damage, as it is in experimental animals; on the contrary, hypertension resulting from such a condition in man occurs only in a minority of cases. Furthermore, there is no connection between the severity of unilateral or bilateral kidney disease and hypertension. Clinical manifestations permit differentiation between a "red" (essential) and "pale" (renal) hypertension although many authors oppose this classification. Essential hypertension eventually leads to kidney damage and becomes, therefore, a secondary renal hypertension. Some authors believe that primary subclinical, minute renal damage causes essential hypertension. The transition from benign to malignant hypertension is compatible with both theories. The authors believe (1) that a various predisposition of the vascular system is the reason why, under similar renal conditions, hypertension develops in one patient but not in another; (2) that a causative connection between renal disease and hypertension can be presumed when the onset of both conditions is simultaneous; (3) that the younger the patient, the more probable is this causative connection, and that then the results from nephrectomy are best; (4) that nephrectomy in the older individual should be per-

formed only when the kidney condition presents an absolute indication and hypertension is high; (5) that the remaining kidney must be anatomically and functionally intact; and (6) that, especially in young people, nephrectomy should be performed early.

The prediction as to the result of the nephrectomy on the hypertension remains dubious in view of possible vascular changes which may have taken place during the hypertensive period; for that reason it is recommended, especially in patients with high diastolic values, to combine nephrectomy with unilateral lumbotransdiaphragmatic sympathectomy and, when necessary, to perform a similar sympathectomy on the other side.

Peridural anesthesia is used as a prognostic test routinely prior to operation in order to test neurogenic factors of hypertension. ERNEST BORS, M.D.

Experimental Urolithiasis. C. W. VERMEULEN, C. R. HELSBY, and R. GOETZ. *J. Urol.*, Balt., 1952, 68: 790.

The authors have demonstrated the ease with which a zinc foreign body can cause a stone to form in the bladder of rats on a diet of purina fox chow checkers and drinking water. During a series of previous studies, it was noted that chance infection with Salmonella enteritidis inhibited the formation of calculi under these conditions.

In the present article the authors report their findings in a carefully controlled group of experiments in rats. It was demonstrated that infection of the bladder with this organism will inhibit stone formation around a zinc foreign body. Stones formed in 37 of 42 rats with sterile urine, and in only 2 rats of 54 infected with Salmonella. Studies of the urine revealed that the average per diem volume in the infected group was slightly greater than in the sterile group (20.1 to 15.8 c.c.). Accordingly, concentrations of calcium, magnesium, and phosphorous were lower in the former. There was little variation in *p*H.

A second group of experiments was performed to test the influence of introducing Salmonella enteritidis as an infecting organism once stone formation had begun. The majority of the stones underwent partial dissolution under these circumstances. The mechanism of this action is not clear. It is being investigated further. In vitro experiments have failed to demonstrate any dissolution of stones in urine infected with Salmonella.

JOHN T. GRAYHACK, M.D.

Significance of Testicular Exfoliation in Male Infecundity. MARY BARTON and B. P. WIESNER. *Brit. M. J.*, 1952, 2: 958.

The authors have investigated nearly 200 cases of infecundity combined with exfoliation of cells into the seminal fluid. The following conclusions have been drawn. In about three-fourths of the cases definite pathological conditions were demonstrated, most common of which were seemingly localized infective conditions such as bacilluria or chronic sinusitis. Effective treatment of these conditions resulted in reduced exfoliation and improved fecundity in one-third of these cases.

The authors suggest that specific hormone therapy be deferred until exfoliation has at least begun to decrease and that premature efforts to increase the invasive power and viability of spermatozoa by such means are quite likely to fail.

JOSEPH E. MAURER, M.D.

SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS

CONDITIONS OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC.

Psoriatic Arthritis. Observations on the Clinical, Roentgenographic, and Pathological Changes. MARY S. SHERMAN. *J. Bone Surg.*, 1952, 34-A: 831.

Charles Bourdillon, in 1888, was among the first of many writers alluding to the concomitant existence of arthritis and psoriasis. The disease is, by and large, most common in the male. In the majority of cases there was an interval of several years between the onset of psoriasis and the atypical arthritis. Of the author's 12 patients, 2 developed both lesions simultaneously. Disease of the nails appeared before the arthritic manifestations in all 12 patients. Characteristically, the arthritic symptoms were confined to the fingers and toes in all of the patients; an occasional case may show involvement of the spine as well as of the peripheral joints.

The symptoms are insidious or acute. The affected fingers are tense, livid, with shiny skin, and simulate the appearance of gout. Pain is usually present. Joint pathology corresponded to involvement of the nails in each case of the author's series. In no case was there evidence of Heberden nodes, even though some 20 per cent of the cases of rheumatoid arthritis exhibit them.

Roentgenographic findings in psoriatic arthritis are: moderate to severe bone atrophy, marginal erosions of the interphalangeal joints, and late extension of severe bony atrophy to shafts of the involved joints. Bony ankylosis is not commonly seen.

The most common location appears to be in the distal joints of the fingers. Contrariwise, when the disease affects the feet, all of the joints become involved. It is here, too, that ankylosing deformities are greatest. Subsequent subluxation is eminently abundant. In the hands, however, the disease rarely ascends toward the metacarpal phalangeal joints.

Biopsy studies revealed pale synovial membranes with edema and granulomatous growths within and outside of the respective capsules. With the passage of time these changes become worse, the articular surfaces become irregularly punched-out and bone atrophy is greatly exaggerated. Pannus formation was not observed in any of the 12 reported cases.

The article is replete with many excellent photographs, roentgenographs, and photomicrographs which enrich the value of the author's contribution. A detailed case report is presented.

The treatment is purely empiric. ACTH promises but temporary remission of the psoriasis and affords symptomatic relief of the arthritic manifestations. Maintenance doses of ACTH for the skin disease are larger than those required for the alleviation of the joint disease.

SAMUEL L. GOVERNALE, M.D.

Tendon Transplantations in the Lower Extremity. A Review of End Results in Poliomyelitis. Tendon Transplantations about the Foot and Ankle. JOHN A. REIDY, THOMAS F. BRODERICK, JR., and JOSEPH S. BARR. *J. Bone Surg.*, 1952, 34-A: 900.

The authors reviewed 100 cases of tendon transplantation about the foot and ankle observed at the Poliomyelitis Clinic at the Massachusetts General Hospital, Boston, during the period from 1920 to 1949. There were 125 transplantations on 110 extremities. The ages of the patients varied from 5 to 46 years. There were three main groups: (1) the anterior, in which the tendon was transplanted to the dorsum of the foot distal to the ankle joint to reestablish or strengthen the function of dorsiflexion, 74 cases, (2) the posterior, in which the tendon was attached posterior and distal to the ankle joint, into the os calcis or the tendon achillis to improve the power of plantar flexion, 34 cases, and (3) toe extensor transplant, in which the extensor tendons of the toes were transferred to the dorsum of the foot to assist in dorsiflexion and eliminate "cock-up" deformities of the toes, 17 cases.

The peroneal tendons were transplanted more frequently than any others in the foot. Most of the patients in this series had deformity or instability requiring arthrodesis or some other bone procedure. Some required interphalangeal joint fusion, lengthening of the tendon achillis, or plantar fasciotomy.

The following basic requirements are necessary for success in tendon transplantation:

1. There must be a free range of passive motion and no deformity in the joint or joints to be activated by the transplanted muscle.
2. The muscle or muscles to be transposed must have sufficient power to substitute adequately for the paralyzed muscle or to reinforce a weak one.
3. The line of pull of the transposed muscle must be direct and must follow the course of the muscle to be replaced.
4. Its anchorage should be into bone, through drill holes.
5. The normal blood and nerve supply of the muscle must be preserved.
6. Muscles which have similar or related actions give better results than antagonists.
7. The amplitude of pull of the transposed tendon must be of the same order as that of the paralyzed one for which it substitutes.
8. The gliding mechanism of the transposed tendon must be preserved by gentle handling and by placing it in a muscular or subfascial compartment and not subcutaneously.
9. The tendon must be attached under slight to moderate tension.
10. The joint should be splinted in this position with no postoperative strain for about 3 weeks.

11. Careful functional re-education of the transposed muscle is necessary, with avoidance of undue fatigue or strain.

Approximately one-third of the transplantations were failures, one-third were fair, and one-third were good to excellent. The results were better in patients over 11 years of age. Restoration of a weakened foot to normal strength and function is impossible.

DANIEL H. LEVINTHAL, M.D.

Tendon Transplantations in the Lower Extremity. A Review of End Results in Poliomyelitis. Tendon Transplantations at the Knee. THOMAS F. BRODERICK, JR., JOHN A. REIDY, and JOSEPH S. BARR. *J. Bone. Surg.*, 1952, 34-A: 909.

The authors give a historical review of tendon transplantation since 1881, including references to Nicoladoni, Goldthwait, Drobnik, Lange, Tubby, Calot, Crego and Fischer, Leo Mayer, Biesalski, Steindler, and Ober.

In an end-result study of 39 transplants in 38 patients operated on for knee extensor paralysis at the Massachusetts General Hospital, Boston, during the period from 1922 to 1946, 12 patients had required long leg braces preoperatively. Seven were able to discard these braces after surgery. Twenty-seven of the 39 were still unable to extend the knee against gravity after the operation. Some of the patients who were able to extend the knee against gravity were unable to discard their braces, while some who were unable to extend the knee against gravity after the operation were able to discard their braces.

The choice of muscles to be transplanted may be made from the biceps, sartorius, semitendinosus, and gracilis, in that order, according to Mayer. Greater study and care in the selection of cases for tendon transplantation for extensor paralysis at the knee is desired. Function is further impaired in some cases by postoperative hyperextension deformities, lateral dislocation of the patella, or lateral instability.

DANIEL H. LEVINTHAL, M.D.

A Clinical Evaluation of Tendon Transplantations for Poliomyelitis Affecting the Lower Extremities. RAYMOND F. KUHLMANN and JOHN F. BELL. *J. Bone Surg.*, 1952, 34-A: 915.

The case records of 1,555 patients with paralytic poliomyelitis who were observed and treated in Vermont during the period from 1914 to 1949 were reviewed. Of these, 255 had had one or more tendon transplantations about the knee, ankle, or foot, and 162 of the latter were interviewed and examined for this study. These 162 patients represented 395 separate tendon transplantations, many of which had been accompanied by adjuvant procedures, such as heel cord lengthening, plantar fasciotomy, tenodesis, and stabilizing operations.

There were 63 tendon transplantations about the knee in 32 patients, and 205 tendon transplantations at the ankle in 125 patients. There were also 127 tendon transplantations in the foot in 64 patients.

TABLE I.—TENDON TRANSPLANTATIONS FORWARD

Tendons	Combined good plus excellent rating (*Per cent*)
Tibialis anterior	80
Peroneus longus	61.6
Peroneus longus and peroneus brevis	33.3

TABLE II.—TENDON TRANSPLANTATIONS BACKWARD

Tendons	Combined good plus excellent rating (*Per cent*)
Peroneus longus and tibialis posterior	66.6
Peroneus longus	40
Peroneus longus and peroneus brevis	28.6

Some of the patients had transplantations in more than one location.

Subjectively, most of the patients with tendon transplantations about the knee were satisfied, but this group was objectively disappointing. It was found that approximately 40 per cent of the transplanted tendons in the foot lost some degree of muscle power in transference. Unless the foot was adequately balanced medially and laterally, the tendons which were left at their normal insertions were capable of acting as deforming elements despite arthrodesis. The functional results were superior when tendon transplantation was combined with bone stabilization. DANIEL H. LEVINTHAL, M.D.

SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC.

Congenital Bilateral Angulation of Both Bones of the Leg with Pes Planus and Plantarly Flexed Talus. PAUL W. LAPIDUS. *Bull. Hosp. Joint. Dis.*, 1952, 13: 356.

The author reviews 15 cases of congenital angulation of both bones of the leg with pes planus and plantarly flexed talus, reported in the literature, and presents one case of his own. This case is well documented with roentgenograms of the patient from the age of 1 day to 4 years. The treatment was conservative, consisting of plaster casts and Denis Browne splints. Complete straightening of the concave anterior angulation of the distal tibias occurred. There were associated posterior skin creases and anterior skin dimples. There is no known explanation for these phenomena. The author states that osteotomy should not be performed until a long period of watchful observation has elapsed.

D. KEITH MCELROY, M.D.

FRACTURES AND DISLOCATIONS

Atlas-Axis Dislocation Following Cervical Adenitis. ROBERT D. MERCER. *Cleveland Clin. Q.*, 1952, 19: 161.

Rotary dislocation of the atlas on the axis in association with infections about the head and neck

and without known trauma is seldom described. Anatomically, there is forward rotary dislocation of the atlas on the axis. There is no apparent fracture in the dens nor tearing of the transverse ligament. The condition most often occurs in children of either sex between the ages of 5 and 12 following painful cervical adenitis. It has also been described following acute rheumatic fever, scarlet fever, mastoiditis, tonsillitis, tonsillectomy, and nasopharyngitis. The sequence of events may be as follows: pain in the region of the neck causes voluntary splinting in the position of torticollis; the ligamentous structures are weakened by decalcification of their bony attachments as a result of hyperemia accompanying the infection; effusion into the joint spaces may further weaken the ligaments; forward displacement occurs because the weight of the head is normally forward of its center of gravity and the normal inclination of the lateral articular facets is downward, outward, and forward; the displaced atlas is locked into position by spasm and contraction of the prevertebral muscles.

Upon examination, the head is seen in the position of classical torticollis. The patient often supports his head with his hand. Usually there is no spasm of the sternocleidomastoid muscles. There is some limitation in opening the mouth. There is considerable limitation of rotation of the head. Attempted rotation is painful and can be accomplished only by rotating the lower cervical vertebra and the upper trunk. The diagnosis can be established definitely by roentgenograms of the cervical spine in the lateral view and also through the open mouth. Asymmetry of the lateral processes of the atlas and the axis may be observed; also there is a narrowing of the joint space between the atlas and the axis on the side of the dislocation.

Treatment is by simple head traction. The patient is placed on his back with his head in a slightly hyperextended position. The use of a mattress shorter than the bed facilitates this. Traction is applied through a head halter running over a pulley at the head of the bed with weights of 6 to 8 pounds. Countertraction is obtained by elevating the head of the bed. Traction is maintained until good reduction can be observed in the roentgenogram and may require from a few days to a few weeks. When good reduction has been obtained, the head is maintained in position in a Taylor collar for 1 or 2 months. Recurrences are rare.

KENNETH E. SHERMAN, M.D.

Congenital Dislocation of the Knee Joint (Dislocazioni congenite del Ginocchio). GASPARE PERRICONE. *Chir. org. movim.*, 1952, 37: 247.

The author presents 16 brief case histories, with pertinent roentgenological and clinical findings, of congenital abnormalities about the knee joints in patients admitted to the Rissoli Institute, Bologna, Italy. These are only representative instances; other cases have been excluded by the author for the reason that insufficient data were available to justify their inclusion, or they were merely repetitions of reports here included.

The author was not able to demonstrate instances of hereditary transmission; however, there was evidence of familial incidence in that the same abnormality was present in three brothers. A photograph in the original text illustrates this family of brothers and their deformity in convincing manner. The births were nearly all eutocic and with cephalic presentation.

In 3 of the 16 patients whose cases are presented there were luxations of the shoulder and elbow joints; there were 5 instances of congenital dislocation of the hip in addition to the dislocation of the knee joint. Among 5 instances of congenital subluxation of the knee there were 4 hip dislocations, and congenital dislocation of the hip was present in both instances of genu recurvatum. In all of the author's patients, malformations of the feet were present. These ranged all the way from supine equinovarus to flat foot; in all the knee dislocations the patella was either dislocated laterally or was not demonstrable.

From the study of this material the author believes that all three conditions, commonly treated as separate entities (genu recurvatum, congenital dislocation of the knee, and congenital dislocation of the patella), should be considered as different aspects of one primitive cause, and he postulates this cause to be a polyarticular dysmorphism (the effects of arrested fetal development).

This condition of arrested development is traced back (by the author's studies) to the embryo of 125 mm. (third month), since it is only during this epoch of development of the embryo that the knee joint is perfectly formed, the patella only then becoming entirely separated from the femur. The fault of development is considered to consist of a failure of the tibial anlage to follow the process of rotation medially of the femoral anlage, the lower leg thus remaining sharply rotated laterally. This lateral rotation is shown in all the patients photographed.

This dysmorphism in the knee joint then results in two types of deformity: (1) the genu recurvatum and (2) the flexure deformity. To both of these types of deformity the author adds the congenital dislocation of the patella. The genu recurvatum is in turn subdivided into three grades, or stages: (1) the simple recurved knee without displacement of the articular surfaces, (2) the congenital subluxation stage, and (3) the fully developed dislocation. Only one stage of the flexure type of deformity is discussed, since only the more severe complete dislocations of this type of deformity are represented in the material here reported.

It is not considered that the muscular and ligamentous apparatus has nothing primarily to do with the development of the abnormality. The muscular and ligamentous changes are believed to represent sequels of the primordial fault; that is, the failure of the lower leg to follow the process of rotation of the upper leg during fetal development. Two instances

of genu recurvatum are reported in which the muscles and bones were in proper alignment, the dislocation, both anteroposteriorly and laterally, occurring only under stress.

JOHN W. BRENNAN, M.D.

Fractures of the Carpal Navicular. CARRUTH J. WAGNER. *J. Bone Surg.*, 1952, 34-A: 774.

This article presents the results of treatment of fractures of the navicular bone complicated by a septic necrosis of the proximal fragment. Thirty-seven patients with such fractures were studied, representing 22 per cent of a total of 168 fractured carpal naviculars treated. All of the patients received their initial treatment at the institution where the author worked.

Three methods of treatment were used and studied and the findings are presented in this report.

Prolonged immobilization was the type of treatment used in 14 cases. This form of management was not chosen by the physician, but was forced upon him by the patient's refusal to accept other advice. Skin tight plaster was used from the elbow to and including the hand with the wrist in dorsiflexion. The thumb was incorporated to the distal joint in a position of opposition. Use of the hand was encouraged. Casts were changed about every 5 weeks. The follow-up period averaged 3½ years. Results were good in all but 1 case. In the latter, partial collapse of the proximal fragment occurred with shift of the lunate and capitate. Overt arthritic changes occurred in only 3 patients. Mild symptoms of discomfort remained in 7, or 50 per cent, of the group.

A second series of 18 patients were treated by excision of the proximal fragment. All but 2 of these were operated upon about 4 weeks after the injury. Simple excision through a dorsolateral incision was done and the wrist splinted for 1 week. Active exercises were then begun. The average follow-up period in this series was 2.2 years. The end results were not as good in this series as in the group treated by immobilization. Nine, or 50 per cent, of the patients are free of symptoms and all but 2 have returned to previous occupations. Six of the remaining 9 have moderate, and 3 have mild, symptoms. Five find it necessary to use a wristlet for support. Proximal migration of the capitate and medial shifting of the lunate occurred and reached its maximum quickly.

Excision of the entire navicular bone was performed in 5 patients. Follow-up periods averaged 3 years. The results were poor in all. Two patients required arthrodesis. Moderate discomfort, restriction of motion, and radial deviation of the hand occurred. Most of the patients were unable to do heavy work with their hands.

The authors conclude that the best results are secured in this injury by immobilization for long periods of time until revascularization of the fragment has occurred. If this is unacceptable, fairly good results may be secured by excision of the proximal fragment. The question of changes later in life cannot be answered by this series.

DONALD C. GEIST, M.D.

Contribution to the Therapy of Fractures of the Tibial Plateau (Contributo alla terapia delle fratture del piatto tibiale). S. BRANCIFORTI and S. ZAPPOLI. *Chir. org. movim.*, 1952, 37: 275.

The results of the treatment of 95 fractures of the tibial condyles are reported. At the Rizzoli Institute at Bologna, Italy, whence this report originates, Zanoli (*Chir. org. movim.*, 1928, 12: 482) reported the material accruing from 1899 to 1927, Gui reported the material from 1927 to 1940, and now the authors continue the report from 1940 to 1949. In order to make the report as complete as possible, such patients as could be reached were invited for control examination. This resulted in the appearance of 47 patients after a minimum posttraumatic period of 1 year and a maximum of 7 years. These patients included all 4 treated by open operation and 9 of the 16 treated with Delitala's compressor.

Results are shown for all the material in an extensive table. In 40 of the 95 patients the fracture was bicondyloid and in 55 it was monocondyloid. The results were considered to be optimum when flexion and extension movements, the muscular trophism, and the general appearance of the knee seemed to be normal, with absence of pain and abnormal lateral motion (flail joint not present). The results were considered good if flexion of the knee joint amounted to 90 degrees, if the residual varus or valgus condition was not more than 10 degrees with mild pains, perhaps, following protracted walks. Results were acceptable with flexion from 180 to 100 degrees or flexion in which there was a mild limitation of extension, a moderate degree of lateral motion, some pain with weight bearing, and a slight limp. Finally, results were considered to be bad when pain, limping gait, limitation of movements (more than 15–20 degrees), and considerable swelling of the joint itself remained.

Among the patients (31) treated without operation the results were optimum or good in 29 (93.5 per cent) and acceptable only in 2 instances; there were no so-called bad results. In the 2 mentioned cases with unsatisfactory results, 1 patient had a grave form of bilateral comminuted fracture and the other a fracture of the external tibial condyle associated with a fracture of the external malleolus. In neither of these 2 instances could adequate physiotherapy be carried out.

Among the 4 patients treated by open operation, results were optimum in 2 (50 per cent) and bad in the other 2 with pain, limitation of movement, weakness of the part, hypotrophy, and varus. In one of these, in addition, there developed a discharging sinus which required a secondary operation for the removal of the osteosynthetic material.

The best results of all were procured with Delitala's compressor. These were 16 in number (9 were procured for control examination) which occurred in the

cases in which manual efforts failed to obtain satisfactory reduction of the fragments. In all these cases the results were excellent; in only 1 instance (pleurofragmentary comminuted fracture) was there an unimportant residuum of hypotrophy of the musculature of the thigh.

Delitala's compressor consists of a flat plate, molded to the area to be covered, with a sort of spike with a spherical head extending through the soft tissues and impinging on the skeletal part to be compressed. One of these components was usually sufficient for a monocondyloid fracture, while two were employed, as a rule, for the bicondyloid fracture, one on each side exerting counterpressure. When more than two fragments were present the condition was considered unfavorable for use of the method.

Practically the only indication for operation in this material has been the interposition of ligaments or bone fragments, which prevents satisfactory reduction. JOHN W. BRENNAN, M.D.

ORTHOPEDICS IN GENERAL

Paget's Disease (Osteitis Deformans). J. A. ROSENKRANTZ, JULIUS WOLF, and JOHN J. KAICHER. *Arch. Int. M.*, 1952, 90: 610.

This report is a review of the literature on Paget's disease of bone with an analysis of the clinical records of 111 patients with the disease admitted to the Veterans' Administration Hospital, Bronx, New York, between 1941 and 1950.

The incidence of this disease is reported as varying between 1 in 170 to 1 in 15,000 admissions. The rate varies greatly between general hospitals and specialized orthopedic or rheumatic disease hospitals. In the author's hospital, the diagnosis was made 111 times in 94,112 admissions (1 in 850).

The causation of Paget's disease of bone is undetermined. Chronic inflammation, syphilis, toxic irritation with disturbed metabolism, and disturbed endocrine function affecting the bone metabolism have been blamed. Paget's original idea of chronic inflammation has been discarded. Syphilis likewise may be dismissed. The literature concerned with certain phases of bone physiology and of related metabolic factors was reviewed in an effort to study the causative agents in this disease. Alkaline phosphatase is essential to bone formation and plays a part in bone regeneration. To maintain a normal blood and bone alkaline phosphatase the various fractions of the anterior pituitary hormone must be in sensitive balance. Patients with Paget's disease of bone demonstrate impaired dextrose tolerance but not in greater numbers than normal persons. Osteitis deformans occurs more frequently in persons of the older age groups. It is possible that along with evidence of diminished endocrine activity, there is an increase in pituitary growth hormone secretion which has a direct effect on osteoblastic activity and bone metabolism.

Patients with this disease are usually in the older age group. Eighty-one per cent of this group were between 41 and 70 years of age, the average for the entire group being 55 years; 14 per cent were between 21 and 30 years of age. Patients who had sarcomatous changes in their bone lesions were much older than those with primary bone neoplasms; 80 per cent of the latter were from 10 to 40 years of age. The disorder occurs twice as frequently in males as in females. Race is not a significant factor.

The physical findings are interesting and correlate with the symptoms reported by the patients. Neuromuscular disturbances were first, followed by cardiac abnormalities, obesity, prominence of the skull or jaw, bowing of the extremities, emphysema, hypertension, excessive height, and bony deformity. Alterations in the skin temperature over bony involvement could not be correlated.

Associated diagnoses and complications included various forms of arthritis. Arteriosclerotic or hypertensive cardiovascular disease occurred as well as obesity, salivary calculi, and pathological fractures. Eight patients had sarcomatous changes and 1 patient had multiple myeloma in addition to Paget's disease. Urinary calculi are not infrequently found. Nine patients had frank diabetes.

Biochemical studies were reviewed also. The serum calcium was determined in 61 patients and was found to show an average of 10.5 mgm. per 100 c.c. In 74 patients the serum alkaline phosphatase levels were determined and were found to be normal in 23. The acid phosphatase was studied in 54 patients; 5 of this group had elevations above the normal. There were 17 analyses for serum cholesterol and only 5 showed levels of more than 250 mgm. per 100 c.c. The total serum protein and albumin and globulin concentrations were determined in 32 patients. The findings were essentially normal.

Typical roentgenologic findings were observed in these patients. The pelvic bones were most frequently involved, followed by the skull, femur, lumbar spine, thoracic spine, tibia, humerus, cervical spine, scapula, sacrum, ribs, fibula, and mandible. Pathological fractures were found in 17 instances.

No specific therapy has been found for Paget's disease of bone. Various methods are reviewed by the authors. Folic acid and corticotrophin were given to 4 and 2 patients, respectively, and the effects on the serum alkaline phosphatase are recorded.

DONALD C. GEIST, M.D.

Fractures of Spinal Bone Grafts (Les fractures des greffes rachidiennes). ANDRÉ SICARD and CLAUDE GAUDART D'ALLAINES. *J. chir.*, Par., 1952, 68: 601.

Fractures of spinal bone grafts, not always avoidable, are found most frequently in the upper segment of the fusion. They require practically a complete revision, equivalent to a new operation. While the author had only 3.2 per cent of pseudarthroses (19 in 582 cases), other surgeons report between 7 and 28 per cent. The distribution was as follows: 9 fractures in the lumbosacral segment, 4 in the dorsolumbar segment, 6 in fusions of the dorsal spine, and no fracture in the cervical segment. The average age

of the patients was 34 years. In only 1 case was trauma the cause of the graft fracture.

In Pott's disease the fracture usually occurs in the middle of the graft over the greatest convexity, that is, over the tuberculous focus, which spreads and involves more graft material. In some cases there was a tuberculous dissemination to other joints or a primary pulmonary focus.

In many cases the refracture is due to insufficient preoperative build-up of the patient. For good results the process should be arrested, temperature rise should be absent for a few months, and the sedimentation rate should be normal before surgery is undertaken. Decalcification should be replaced by sclerosis requiring 18 months up to 2 years on the average. The author, however, concedes that this unduly long period can be shortened considerably by the use of streptomycin.

The technique of Albee was usually used, but was considered insufficient in Pott's disease in which Halstead's procedure renders safer results. Among 12 cases in which bank bone was used, 7 fractures occurred; however, there seems to be no gross difference between autogenous or bank bone, although the tibial graft is preferable but more susceptible to breakage when very long.

The period of immobilization is 6 weeks for lumbosacral fusion, from 2 to 3 months for fusion in the dorsal spine, and from 4 to 6 months for Pott's disease. Before the patient is allowed to get up, careful x-ray studies should be made.

In tuberculous spines the fracture recurs about 6 to 12 months after the operation, but it occurs earlier in other cases. Recurrence of pain or deformity requires a strict prolonged rest. In Pott's disease with a tendency toward progression the graft will inevitably break. Also, an increase in scoliotic deformity of more than 5 degrees is indicative of pseudarthrosis. If roentgenographic proof is missing (the author does not mention the necessary to-and-fro exposure), careful measuring of the increased angulation may reveal the pseudarthrosis, but often only re-exploration will reveal the complication. Cases of spontaneous consolidation have been reported, and prolonged immobilization may be tried in cases of purely traumatic origin but not in those due to infection, especially Pott's disease.

The fractured area is freshened and either a new onlay or 2 paraspinal grafts are added; they are embedded in subperiostal grooves with immobilization for from 8 to 10 weeks. Another technique consists in excision of the fracture segment and replacement with a "puzzlelike" bone piece. There were 6 good results in 9 cases following immobilization for 3 months, and longer in Pott's disease in which the continuation of the inflammatory process had been the cause of the fracture.

E. H. BETTMANN, M.D.

SURGERY OF THE BLOOD AND LYMPH SYSTEMS

BLOOD VESSELS

Stenotic Arterial Disease of the Artery in Hunter's Canal (Arteriopatia estenosante del canal de Hunter). EDUARDO C. PALMA. *Angiologia*, 1952, 4: 215.

The author describes a new clinicopathologic entity called stenotic arterial disease of Hunter's canal. There are two types: a typical type and a presenile type.

The pathologic changes are localized to Hunter's canal. They are periarterial fibrosis and intimal thickening. The condition is bilateral. Repeated trauma of the systolic wave against the anatomically narrow confines of Hunter's canal in which the artery is fastened is the chief etiologic factor. Muscular action of the structures surrounding the canal and longitudinal hypertonicity of the arteries of the thigh may play some etiologic role.

Typical cases of the disease occur in young adults less than 45 years of age. The presenile type affects individuals from 40 to 60 years of age. Symptoms are those of circulatory insufficiency of one or both lower extremities with claudication, which is usually unilateral. Oscillometric studies and arteriography aid in demonstrating localization of pathologic changes to Hunter's canal. As the disease progresses involvement of the superficial femoral and popliteal arteries often occurs. Usually the condition is segmental and localized, and in the author's cases evidence of arterial insufficiency elsewhere was not demonstrated.

The disease must be differentiated from Buerger's disease and from arteriosclerosis obliterans.

Femoropopliteal arterial liberation is described as the treatment. In some cases arteriectomy with substitution of a vein graft is indicated. The procedure often must be supplemented by lumbar sympathectomy.

In 6 patients with typical cases, 4 were functionally cured and 2 were markedly improved. In patients with the presenile type of the disease, none were functionally cured; however, of a total of 13 such patients treated, 5 were remarkably improved, 6 were somewhat improved, and 2 were listed as failures. FREDERICK W. PRESTON, M.D.

Preserved Arterial Grafts; Experimental Results; Discussion of Preservation of Grafts (Les greffes d'artères conservées; résultats experimentaux; considerations sur la conservation des greffons). LUCIEN MASSÉ, RÉNE TINGAUD, CLAUDE MASSÉ, and JEAN CARLES. *Bordeaux chir.*, 1952, 3: 105.

Since fresh arterial homographs do not survive, but serve only as a framework around which the organism forms a fibrous sheath and epithelial lining, there is no theoretical objection to the employment of devitalized grafts. Such grafts, preserved in alcohol or formalin, remain patent but are rigid. If anticoagulants are administered this method may furnish apparently good results, but the number of failures is not negligible and the transplants rapidly undergo important modifications.

The same statement may be applied to frozen grafts which rapidly develop degenerative lesions.

Better results are obtained with grafts preserved under conditions of so-called latent life. For this purpose the grafts are kept in Hank's fluid, physiologic saline solution, blood, plasma, or serum. In Hank's fluid which contains saline solution, minerals, and glucides essential for preservation of cellular life, grafts remain viable for approximately 1 month. Mesenchymal tissues live longer than muscular fibers. The latter remain viable longer when preserved in blood which is changed at frequent intervals. It is possible that immunologic factors, such as blood group, play a role in preservation of grafts.

IOSEPH K. NARAT, M.D.

The Role of Venous Endothelium in the Inception of Thrombosis. PETER B. SAMUELS and D. R. WEBSTER. *Ann. Surg.*, 1952, 136: 422.

Virchow outlined three variables operating in the pathogenesis of thrombosis: (1) coagulability of the blood, (2) disturbance of the blood flow, and (3) change in the vessel wall. As a result of intensive study of the first factor, the principal stages in the clotting process, once it is initiated, have been outlined. The physiology of venous return is well understood and slowing of the venous blood stream after bed rest and in pathologic states is accepted. The role of the third variable, the vessel wall, and specifically its lining, or endothelium, has remained unclarified. Although the clotting process has been carefully studied in the past, the nature of the changes in the vessel wall following injury, which leads to the adherence of platelets to the endothelium, has not been determined.

The first successful demonstration of changes in the properties of the endothelium following injury was made by Chambers and Zweifach. Their findings indicated clearly that the intercellular cement substance became more sticky after injury to the endothelium with subsequent clotting. In 1947, a great forward stride in the study of the endothelium of larger veins was made by O'Neill, who devised a method whereby the entire endothelial surface of a vein could be studied. He used a silver nitrate staining solution. This stain blackens the intercellular cement and outlines the endothelial cell. This technique is limited, in that structures adherent to the endothelial surface appear as structureless silhouettes.

In an attempt to determine the exact nature of the changes the authors studied the venous endothelium by new techniques which allow permanent preparations to be made and enable one to study at

once the entire endothelial surface of a vein segment and any structures adherent to it. These same techniques are applicable to arterial endothelium. Veins of adult dogs (jugular, femoral, brachial, saphenous, cephalic, and the inferior vena cava) were removed and studied. These new techniques are carefully described and the reader is referred to the previous publications for this technique. After providing suitable controls, experimental injury of the jugular and femoral veins was produced by mechanical and chemical methods as well as by stripping of the venous sheath.

Whatever the type of injury to the vein wall, the endothelium reacts in the same manner. The degree of the reaction varies, however, in proportion to the severity of the injury. The sequence of changes can best be described if divided into two stages.

Stage 1. Minimal reaction following injury to the vein wall. The structure and configuration of the endothelial cells are unchanged. On the intercellular cement lines a great number of structures appear. Actually these are platelet thrombi adherent to the cement lines covered with fibrin clumps. The fibrin tends to spread along the intercellular lines and across the cell surface to join contiguous masses of fibrin. Injury may stop at this stage but if the injury is severe or long continued the reaction progresses to the next stage.

Stage 2. Maximal reaction following injury to the vein wall. The continuity of the endothelial surface is disrupted and pathologic anatomic changes appear in the endothelial cells. Intracellular clumps develop which enlarge until the cell body disappears. Large areas of the vein wall may desquamate their endothelium in this way. Fibrin is deposited in these desquamated areas. Contrary to expectation, the amount of fibrin on endothelium showing a maximal reaction is usually smaller than the amount produced in minimal injury.

The most significant finding, as judged by the authors, is that the point at which the formed blood elements are most likely to adhere, i.e., the point of lowest surface tension, is the intercellular cement line. After injury to the vessel wall, the "stickiness" of the cement substance appears to increase and platelets become adherent in great numbers. These changes represent alteration in the physiology of the endothelium and occur in the absence of demonstrable anatomical change in the endothelial cell. It appears that the endothelium of all blood vessels is able to react to injury or a change in the environment without gross structural change.

A number of investigators have speculated on the role of the intercellular cement in the inception of thrombosis. It has been suggested that injury of the endothelium allows the sticky intercollagenous cement substance to pass through the endothelial cells to the vein surface, or that the endothelial cell, by virtue of its fibroblastic potentialities, becomes adhesive. Certainly on staining preparations as described, there is adequate evidence to suggest the sequence of events as reported.

From a biological point of view, thrombosis is a means of maintaining the fluid level of the vascular compartment by plugging holes in it when they occur. The unchecked spread of thrombosis would be a catastrophe equal in magnitude to exsanguination. The physical action of the blood in diluting and washing away locally produced thrombotic factors is one of the chief detriments to the spread. Another physical factor is the absorption of thrombin on the relatively great surface of newly formed fibrin. Secondary defenses included plasma antithrombin, tissue and blood antithromboplastins, and possibly heparin and its plasma cofactor "circulating fibrinolysin," which may play a part in dissolving the clot, once it has formed. The surprising limitation of fibrin production in stage 2 injury of the endothelium and total desquamation may be related to a more rapid mobilization of clot-limiting mechanisms or to their more rapid release through a discontinuous endothelial surface. Studies in progress would indicate that the mast cells, which are regarded as the source of heparin, occur in layers 20 to 30 microns below the endothelial surface. In addition, they occur in large numbers around the vasa vasorum. In these locations, the rapid local release of heparin is possible.

It is well known that if a vein is doubly ligated the blood in the enclosed segment will not clot. This is true even if the vessel wall is previously injured. Study of the endothelium of such injured segments by the new technique reveals that thrombosis occurs at the points of injury, but it does not spread into the completely stagnant blood. These experiments pose a stumbling block to those who view stagnation as the most important factor in thrombosis.

It is commonly held that the endothelium of blood vessels draws its nutriment from the blood in contact with the surface. This concept is upheld by the results of the experiments in stripping. The desquamation of endothelium, which O'Neill ascribed to cutting off the blood supply to the endothelium by interruption of the vasa vasorum, is shown to be a foreign-body reaction to the rubber dam used in separating the blood vessel from its bed.

The experiences with heparin support the contention that heparin is effective in preventing deposition and agglutination of platelets on the endothelial surface. The affinity of heparin for intercellular cement in vitro is shown by its ability to bring about staining of that substance by toluidin blue, which is a specific stain for heparin. This tendency for heparin to combine with the cement is further evidence of the proteinic nature of the cement substance.

When the blood was rendered incoagulable by a large dose of heparin, thrombi still appeared on severely injured walls. This suggests that local mechanisms which operate to protect injured areas in the vessel wall with fibrin coats are exceedingly powerful. It is probable that thromboplastic substances are produced in excess which permits limited fibrin production.

The observations of the authors are in accord with Frykholm's thesis that thrombosis begins in the

small intramuscular veins draining groups of muscles, such as those of the calf and adductor group. These muscles are subject to pressure of the mattress on the limb, which in combination with a diminished venous return results in a collapse of the vein lumen. Apposition of the endothelial surface is postulated to cause injury and initiate thrombosis.

The smaller veins studied in this series were peculiarly susceptible to injury, despite all technical precautions. It is believed that their tendency to collapse during dissection played a great part in the appearance of injured areas and prominent fibrin production. The fact that injury and thrombosis were materially reduced when the veins were kept distended with a limb tourniquet during dissection supports this idea.

The demonstration by Helen Wright and others that an increase in platelet stickiness occurs postoperatively is given added weight when viewed in conjunction with the results of this work. It is obvious that sticky platelets will be much more likely to adhere to a sticky, than to a nonwettable, endothelial surface. LEROY J. KLEINSASSER, M.D.

The Influence of Anticoagulant Administration on The Rate of Recanalization of Experimentally Thrombosed Veins. H. PAYLING WRIGHT, M. M. KUBIK, and M. HAYDEN. *Brit. J. Surg.*, 1952, 40: 163.

Little is known about the recanalization of already thrombosed vessels in the presence of anticoagulants. The clot may disappear rapidly but the mechanism by which this is accomplished has not been studied. It is known that in the postoperative period, after the small vessels of the surgical site have become plugged by thrombus and hemorrhage is completely arrested, the administration of anticoagulants, even many days later, may cause some degree of bleeding from the wound within a short time. Such bleeding usually occurs only if the prothrombin activity of the blood is allowed to fall below 20 per cent of normality. It is, moreover, confined to the wound site. The authors have noted repeatedly that hemorrhage frequently occurs in rats which have had their tail tips cut for blood sampling several days prior to the first dose of tromexan; in untreated rats, however, this never occurs. It appears that in these cases, both in rats and in man, the thrombus plugs are "dissolved" or "washed away" so that the vessel is again patent and bleeding can take place.

In order to evaluate the effect of anticoagulant treatment on the rate of recanalization of veins occluded by experimentally produced thrombi, the marginal vein of the ear in rabbits was used. Thrombosis was induced by venous occlusion for a period of 10 minutes after the injection of either sodium morrhuate (5%) or of thrombin solution (1,000 units/c.c.). One group of animals were treated with tromexan and the control group received no treatment whatever. The patency of the ear veins was studied by phlebography. The anticoagulant therapy was controlled by the use of Quick's single stage method of prothrombin time estimation. Fibrinolytic activity was also studied and the same plasma samples were tested for prothrombin time measurement.

From these studies it was apparent that the rate of recanalization of such thrombi was about three times as long in control animals as in those treated with tromexan. The studies would indicate that it is unlikely that tromexan has any direct proteolytic action upon formed fibrin. The failure to digest fibrin clots at any dilution of plasma suggests that the balance between the enzyme plasmin and its inhibitor, antiplasmin, is not disturbed even though the prothrombin level of the blood is considerably reduced.

A possible explanation for the earlier recanalization is offered. It is suggested that the surface of a thrombus in contact with flowing blood may be supposed to undergo accretion through the continual deposition of fibrin film on its exposed surface. Any proteolytic action of the blood enzymes is, therefore, apparently without effect. When the clotting mechanism is impaired, however, the enzymic digestion of the fibrin network proceeds uninterruptedly. The action of the anticoagulant may, therefore, be an indirect one, which thus allows the recanalization of the vessel to take place in a shorter time than would occur under normal conditions.

LEROY J. KLEINSASSER, M.D.

BLOOD; TRANSFUSION

Antagonism of the Anticoagulants "Dicumarol", "Tromexan", and "Phenylindandione" by Vitamin K. M. TOOHEY. *Brit. M. J.*, 1952, 2: 867.

Although there is a definite lack of response to water soluble preparations of vitamin K, there is considerable evidence that there is an effective response to intravenous doses of 500 mgm. of vitamin K_1 oxide and vitamin K_1. This is a study of 18 patients who received vitamin K_1 orally (500 mgm.), 7 after having been treated by dicoumarol, 4 after having been treated with tromexan, and 7 after having been treated with the more recently introduced anticoagulant "phenylindandione."

In the 18 patients thus treated the single oral dose of 500 mgm. of vitamin K_1 was completely effective in restoring a safe prothrombin level after severe and prolonged prothrombin deficiency. This effect was evident within 8 hours and the action of the vitamin was apparent within 4 hours. It is pointed out that there may be a reflex phenomenon after the drug is administered so that subsequent examinations will again apparently show continued effect of the anticoagulant drugs, and additional vitamin K_1 should be given if necessary. It is also essential to recognize that reduction in the prothrombin time by vitamin K_1 will again expose the patient to dangers of thromboembolic phenomena for which the patient may have been treated in the first place. In 3 cases of frank hemorrhage due to anticoagulant drugs, an oral dose of vitamin K_1 was in itself suffi-

cient to stop bleeding in a matter of hours without the use of transfusions. In using large doses of vitamin K_1 it must also be remembered that the patient may become refractory to anticoagulant drugs and require much larger doses of the anticoagulant drug after the administration of the vitamin.

LEROY J. KLEINSASSER, M.D.

Gangrene of the Forearm and Hand Following the Use of the Radial Artery for Intra-Arterial Transfusion. A Case Report. JAMES YEE, PHILIP R. WESTDAHL, and JOHN L. WILSON. *Ann. Surg.*, 1952, 136: 1019.

The authors report the case of a 30 year old white male who because of a gun shot wound through the abdomen was admitted in severe hemorrhagic shock. As the patient failed to respond to the usual measures designed to elevate the blood pressure the left radial artery was utilized for transfusion of 2,500 c.c. of cold bank blood over approximately 3 hours.

At the conclusion of the laparotomy and abdominal repair the left hand was noted to be cold and cyanotic. Its condition did not improve in spite of left cervical sympathectic procaine blocks, release of tension through an incision along the entire ulnar side of the forearm, and a periarterial sympathectomy. The forearm and hand progressed to gangrene necessitating amputation just above the elbow on the fourth day. An arteriogram of the amputated arm revealed patency of the ulnar artery and the palmar radioulnar arterial anastomosis.

The authors list 3 other cases in the literature in which intra-arterial transfusion via the radial artery resulted in complications varying from superficial necrosis of the skin over the artery to gangrene of the forearm and hand. They also list 27 cases of uncomplicated radial artery transfusions.

Possible causes for the development of gangrene are believed to be perfusion of the extremity with unoxygenated blood and the use of cold bank blood which results in widespread vasospasm. Factors of lesser importance may be vascular anomalies, too great infusion pressure, and the use of plasma-accentuating tissue hypoxia.

ALLAN D. CALLOW, M.D.

Rhesus Immunization by Intramuscular Injection of Foreign Blood (Rhesus-immunisierung durch intramuskulaere Fremdblutinjektionen). HANS BERGMANN. *Wien. med. Wschr.*, 1952, 102: 609.

Not only blood transfusions but also intramuscular injections of Rh-positive blood may give rise to the formation of immune antibodies in an Rh-negative woman. Therapy with intramuscular blood injections has been administered in cases of multiple sclerosis, radiculitis, and other neurologic conditions.

An impressive pertinent case is reported. An Rh-negative primigravida, 28 years of age, had received a series of 12 intramuscular injections of 20 c.c. each before and during her pregnancy for suspected multiple sclerosis. The donor was the Rh-positive husband. The newborn presented a typical case of erythroblastosis with kernicterus and expired 3 days after birth in spite of exchange trans fusion.

WERNER M. SOLMITZ, M.D.

SURGICAL TECHNIQUE

OPERATIVE SURGERY AND TECHNIQUE; POSTOPERATIVE TREATMENT

Acute Circulatory Failure During Surgical Operations. J. F. Dark, T. Dinsdale, A. N. Guthkelch, and L. P. Lassman. *Brit. M. J.*, 1952, 2: 533.

The causes of sudden heart failure in the operating theater fall into 3 main groups: (1) those due to or associated with pre-existing disease, usually the disease for which the operation was undertaken; (2) those resulting from the immediate complications of surgery—shock, hemorrhage, and air embolism; and (3) those due to the anesthetic agent or technique.

In group 1, the only possible treatment is to try to undo the damage as quickly as possible. If cardiac massage is used, it is only incidental. Cardiac massage plays little part in resuscitation from shock or hemorrhage.

Deaths of patients in group 3 first occurred after the use of chloroform. More recently, cardiac arrest has been reported after spinal analgesia and cyclopropane. The greatest obstacle to success in these cases is the waste of time. Cardiac massage is successful far more often than is treatment with intracardiac injections, and it can be done more quickly. A carefully rehearsed routine should be put into practice as soon as an impending catastrophe is suspected. It has been found best to have the anesthetist direct this treatment rather than the surgeon.

Samuel Kahn, M.D.

Personality Changes Following Cardiac Arrest. John N. Gordon, Irwin R. Sternlicht, and Oswald M. Weaver. *U. S. Armed Forces M. J.*, 1952, 3: 1469.

Personality changes may occur as a result of cerebral anoxia, particularly when the anoxia is of sufficient duration to cause irreversible brain damage. There is general agreement that it is the duration of the anoxia and not the cause of its occurrence that is of major importance in determining the extent of damage.

The cerebral cortex has a very high rate of oxygen consumption and also a very high concentration of cells per unit volume and therefore suffers the most from anoxia. Douglas states that the regions of the brain with the highest metabolic rate suffer the most from anoxia. No one area of the brain can be predicted to suffer the most, but laminas 3 and 4 appear to suffer as much as any.

The authors report a case in which a soldier 21 years of age had cardiac arrest after a tonsillectomy (August 22). Cocaine spray (10 per cent) had been used to spray the throat and local procaine infiltration anesthesia was used. The patient had received 100 mgm. of pentobarbital preoperatively. Shortly after the operation, he complained of severe headache, began to convulse, and became cyanotic. A thoracotomy between the third and fourth ribs was performed approximately 5 minutes after the episode started, and the heart was found to be in standstill. The heart was massaged at about 80 beats per minute and 1 c.c. of 1 to 1,000 epinephrine was injected into the heart muscle. Approximately 5 minutes later, fibrillary movements were noted and 5 c.c. of 2 per cent procaine hydrochloride were injected into the heart chamber and massage was continued. Ten minutes later, irregular ventricular beats were noted and 10 c.c. of 2 per cent procaine hydrochloride were injected intracardially. Five minutes later a regular beat was maintained, the chest was closed, and an under-water drainage system was installed. An electrocardiogram at this time revealed a left bundle branch block. The patient was unconscious when he was taken from the operating room. His blood pressure was 88/72 and his temperature was 101° F. An endotracheal tube was left in place to maintain an adequate airway.

The following day (August 23), there was little change except for the return of the cough, swallowing, and lid reflexes.

On August 24 there appeared to be slight improvement. On the following day, vital signs were stabilized. On August 28, since he could not swallow food, a Witzel type of gastrostomy and tracheotomy were done. On August 29 he voided spontaneously. He did not respond to questioning. On September 7 an electrocardiogram suggested epicardial damage. On September 8 he was taking food by mouth and was able to answer simple questions. By September 18 he was improving but vision was poor in both eyes and he could not count fingers. He responded at the moronic level, and would urinate and defecate anywhere but would not soil himself.

It was necessary to keep him in a closed neuropsychiatric ward for some time because he would not take care of himself and had started a small fire with a cigarette in a napkin. A battery of neurologic and mental tests were given, which revealed visual and partial tactile agnosia, graphomotor aphasia, and motor ataxia. He was unable to recognize common objects such as a key and a penny either by sight or by touch.

On October 25 he could not function at all on the Wechsler-Bellevue performance subtests and, although his judgment was good, he concentrated poorly. His memory for past events was poor, but for recent events was good.

By January 8, 1952, minimal improvement could be noted in specific areas, such as abstract capacity. His aphasia and agnosia had improved slightly and his mother thought that he was functioning at about 40 per cent of his normal level. She believed that most of his difficulty was in the visual and memory areas.

Because of his good judgment and immediate memory function, the prognosis for further improvement, under an intensive retraining program, was believed to be good. JOHN H. DAVIS, M.D.

ANTISEPTIC SURGERY; TREATMENT OF WOUNDS AND INFECTIONS

Respiratory Burns with Special Reference to Pulmonary Edema and Congestion. DOMINGO M. AVIADO, JR., and CARL F. SCHMIDT. *Circulation*, 1952, 6: 666.

It is contended that respiratory burns of the lungs have been a neglected study. This report analyzes the important functional changes resulting from steam inhalations, particularly those of respiration, circulation, and blood constituents. Because pulmonary congestion and pulmonary edema were so prominent in the investigation, attempts were made to determine, in greater detail, the behavior of the pulmonary circulation by radioactive technique and electrical resistance measurements. The methods revealed certain interesting characteristics of lung circulation which were studied for their therapeutic possibilities.

Dogs under morphine and chloralose anesthesia were used exclusively. A metal tracheal cannula was inserted and connected to a manifold which, by opening and closing the appropriate stopcocks, allowed the animal to inhale room air or steam at atmospheric pressure.

The most prominent effect of tracheal steam inhalation is an immediate apnea that is followed in a minute by polypnea. This inhibition arises from lung receptors which are permanently damaged after activation by steam. A bradycardia that accompanies the apnea is also a reflex arising from extrapulmonary receptors, unidentified in these experiments. The uptake of heat is reflected by a sudden rise in the aortic blood temperature. A central medullary stimulation by warm blood is the best explanation for the short-lasting peripheral vasoconstriction, polypnea, and tachycardia, which all coincide with the peak of the arterial blood temperature rise. The stabilization of temperature at a higher level is caused by the loss of heat-eliminating function of the burned lungs and passages. There is a blood hemolysis which is more extensive than that encountered in skin burns, and the froth in respiratory passages appears within half an hour after steam inhalation. One prominent accompanying sign is an increased respiratory minute volume.

Radioactive measurements of the lung blood volume show an immediate congestion after burning. This is due to a venous constriction, which is the only possible interpretation from increased radioactivity, decreased pulmonary flow, increased pulmonary arterial pressure, and normal left atrial pressure. A pulmonary venous constricting mechanism is also initiated by blood infusion so that blood is stored for some time after it is injected intravenously. This response persists after vagotomy.

An attempt to treat pulmonary congestion after steam inhalation by arterial bleeding was unsuccessful because of a neurogenic mechanism that stabilizes the pulmonary blood volume at a constant level. Bleeding caused a shifting of the blood from the peripheral depots into the lungs.

An electrical resistance method was adapted for intact dogs with several modifications in technique and interpretations. The alternating current resistance, however, measures fluid changes in the lung but cannot distinguish between blood and edema fluid. It can measure lung blood-volume changes.

STEPHEN A. ZIEMAN, M.D.

ANESTHESIA

General Anesthesia for Tonsillectomy by Dissection in Children. JOHN BULLOUGH. *Lancet*, Lond., 1952, 2: 999.

A series of 172 children undergoing tonsillectomies were studied, to evaluate the use of thiopentone for induction as compared to nitrous oxide induction. Ninety-eight children received thiopentone intravenously as a combined basal anesthetic for induction of anesthesia and were compared with 71 children who received nitrous oxide induction as controls.

The combination of thiopentone intravenously, and nitrous oxide, trilene, and ether was described in a typical case of a child undergoing tonsillectomy.

The advantages of this technique were primarily those for the child, the anesthetist, and the surgeon and nurses. The disadvantages were few. The most important one is the possibility of a laryngospasm immediately after induction; however, with proper prophylaxis this disadvantage was overcome. The rapidity of induction, with little straining or coughing, minimal fear on the part of the child, very slight operative bleeding, and the rapidity of postoperative recovery were found to be most advantageous.

JOHN E. KARABIN, M.D.

Problems of Anesthesia and Transfusion in Major Surgery on the Hip Joint. ERNEST R. KERN. *Current Res. Anesth.*, 1952, 31: 350.

The new surgical technique with vitallium and acrylic have made hip arthroplasty a frequent operation. The seriousness of hip operations is attributed to two factors—trauma and hemorrhage. It is the observation of the author through an experience involving 395 anesthesias in connection with major hip operations that the traumatic factor has been greatly exaggerated, at least as far as nonvisceral surgery is concerned, and that deep general anesthesia does more harm than good in preventing shock. Of undeniable importance, on the other hand, is hemorrhage. The volume of blood lost is extremely variable, not only according to the length of the operation but also according to its nature. Operations involving a bone phase of any length are more hemorrhagic than others. A table is given which demonstrates a graduated scale of seriousness

in hip surgery. The table enables one to anticipate with a sufficient degree of accuracy the blood reserve required for each operation.

The technique of anesthesia is described. It involves three fundamental principles: (1) the anesthetic must be kept as compatible as possible with the surgical requirements, (2) the anesthesia must be ephemeral, produced by agents which are rapidly eliminated (pentothal and curare with inhalations of nitrous oxide and oxygen are used), and (3) oxygenation must be ample. Transfusions are given by the indirect method in amounts to prevent operative shock. Very rarely are pressor drugs needed. Among the 395 operations reported, only 4 patients had shock, reversible in each case. There were no accidents or immediate mortality. There was almost complete absence of respiratory complications. This was considered due to the avoidance of anesthetic agents which increase bronchial secretions, proper ventilation during operation, and rapid recovery of consciousness or reflexes at the end of operation. Thrombophlebitis complicated surgery in 12 per cent of the cases. Most of the patients presented few postoperative difficulties. MARY KARP, M.D.

SURGICAL INSTRUMENTS AND APPARATUS

Split-Thickness Skin Grafting of Amputation Stumps. T. J. CANTY and E. E. BLECK. *Plastic & Reconstr. Surg.*, 1952, 10: 99.

Three types of open amputation stumps are usually received at this center for definitive treatment. The open flap stump is considered to be the most desirable type for closure. The latter consists of an anterior and posterior flap, both of which were formed at the time of amputation in the forward area. The open circular stump consists of skin, muscle, and bone circularly fashioned at the proper retraction levels. This form of amputation stump should be distinguished from the guillotine type which is formed by the section of all the tissues of the extremity at the same level without regard to retraction. Continuous and strong traction usually fails to draw the skin down for closure of the stump.

The split thickness skin graft is the method recommended as the procedure of choice for secondary closure, for the repair of surface defects of stumps, and to conserve the length of the short above-the-knee or below-the-knee stump. As a form of secondary closure, the skin graft is used principally for the closure of circular amputation stumps after traction becomes ineffective. It is also used for the closure of skin after guillotine or traumatic amputation. In the latter cases, after closure, revision or re-amputation with properly formed flaps is done. Surface defects of stumps closed by the split thickness graft followed by the application of a prosthesis did not result in breakdown of the graft. Follow-up has revealed that these grafts do not take on the characteristics of normal skin.

The following technique is recommended for the closure of amputation stumps. Traction is used until skin coverage can no longer be obtained. The granulating wound if infected is kept moist with wet dressings containing bacitracin. After the infection is cleared, xeroform or furacin gauze pressure dressings are applied. The split thickness graft is applied when the granulations become firm and red in color. The thickness of the grafts are varied depending on the wound, the range from 0.0010 to 0.0018 of an inch. If the graft is for a final repair, the thickness should be in the range of 0.0015 to 0.0018 of an inch. Before applying the graft, all granulations are shaved off to obviate wrinkling or graft contracture. The graft is sutured in place with No. 0000 silk.

The authors use the open postoperative dressing, exposing the graft to the air but protecting the site within a wire cage. After 7 days the sutures are removed. The closed pressure dressing may also be used. The open method is preferable because pressure against areas of deficient circulation does not exist and pooling of the exudate does not occur. After the graft has healed a shrinker bandage is applied to eliminate edema. This is followed by either the above-the-knee suction socket or the below-the-knee soft socket, depending on the case.

B. G. P. SHAFIROFF, M.D.

Observations on the Circulation of Tubed Skin Pedicles Using the Local Clearance of Radioactive Sodium. J. N. BARRON, J. E. LAING, J. G. COLBERT, and N. VEALL. *Brit. J. Plast. Surg.*, 1952, 5: 171.

Quantitative studies of the circulation of tubed pedicles are made by the clearance rate of radioactive sodium 24 ions in isotonic solution as sodium chloride, with the technique reported by Barron, Veall, and Arnott (*Brit. J. Plast. Surg.*, 1951, 4: 16), improved by the addition of automatic equipment. The circulation Index I (Barron *et al.*, 1951) is a practical method of assessing the relative viability of the tubed pedicle.

In the first stage the tube is formed but it is left attached at both ends so that the blood supply at the attachments is presumably unimpaired. In these investigations three equidistant test points were studied on each pedicle over a period of several weeks, and the circulation index was calculated. The results indicated that from the first postoperative day onward there was no increase in the circulation index and comparison with contralateral control points on the normal skin showed approximately the same circulation as in the pedicle.

In view of these experimental results the authors have been routinely raising the pedicle and transferring one end to a new site in a single operation. Twenty pedicles were raised and transferred to the wrist at the same stage, the largest 10 by 4 inches, and the smallest 6 by 2½ inches. In 1 case the operation failed because of necrosis, but the rest were satisfactory, although many problems arose.

In 7 of the first 10 cases in the series circulatory embarrassment appeared in the early postoperative period. This showed itself either as a terminal con-

gestion at the wrist end or as a more generalized congestion and edema of the tube. In no case was arterial insufficiency seen. Examination showed that the terminal congestion could be due to one or more of the following factors:

1. Hematoma at the inset.
2. Faulty tailoring of the inset itself.
3. Kinking at the wrist end of the tube.

General congestion of the tube was found to be associated with:

1. Hematoma formation in the tube.
2. Kinking at the abdominal end.

In view of these considerations the inset technique was modified to include the following details:

1. Complete and positive hemostasis.
2. More accurate cutting of the wrist defect so that the pedicle would lie under its normal skin tension.
3. Rounding off the corners at the end of the tube.
4. Suturing with a subcuticular stitch.
5. Greater attention to tube support and arm-to-trunk fixation.

Postoperative bleeding was the chief cause of trouble in the early tubes of this series. The authors are convinced that primary vascular failure actually does not exist in tubes of normal dimensions. If circulatory embarrassment occurred the tube and inset were examined for hematoma, and, if found, it was evacuated. The appearance of a tube with hematoma was often similar to a tube which had failed supposedly because of primary vascular failure. Bleeding from vessels supplying the flaps is delayed because of temporary spasm, and when the spasm passes off bleeding occurs before clotting takes place. For this reason all these vessels are ligated on the flap side as the flap is formed. When they have all been tied the tube is gently squeezed to detect other oozing points, which are also ligated.

The prevention of kinking is a dual responsibility: of the surgeon in planning the tube, and of the nurses in seeing that the patient remains in such positions that the tube is not kinked.

The rate at which the circulation is established across a new inset was studied with a tourniquet applied to the abdominal end of the pedicle. The first signs of a blood supply through the implant became apparent within 5 to 7 days. The index increased over the next 2 or 3 days and then became relatively constant, after which the pedicle could be divided with confidence. In some cases in which the circulation was not adequately established within 14 days it was considered desirable to reopen the inset, and in all these an abnormal condition was found, usually hematoma or extravasation, although this was not always apparent on clinical examination.

In comparison with the sigmoid type of curve obtained from a normal wrist inset, the retarded development of the anastomosis gives a curve with a slope so flat that it can be estimated that it will be 2 or 3 months before there will be an adequate circulation in the tube; this fits in with the accepted ideas as to the time required for scar resolution.

One of the main conclusions is that a properly made pedicle is inherently viable, and that an inadequate blood supply is rarely, if ever, the primary cause of failure. Apart from their value as a diagnostic test, the sodium clearance measurements can provide the quantitative data needed for the solution of many problems relating to the care of pedicles and flaps. JEFFREY FERRIS, M.D.

PHYSICOCHEMICAL METHODS IN SURGERY

ROENTGENOLOGY

Bone Changes in Cases of Suprasellar Meningioma. GIOVANNI DI CHIRO and ERIK LINDGREN. *Acta Radiol.*, Stockh., 1952, 38: 133.

Reactive hyperostosis that often makes it possible to determine the exact sites of meningiomas elsewhere in the cranium has been reportedly associated with the suprasellar variety of tumor only rarely.

On the basis of the present investigation the authors contend that these tumors are not infrequently associated with bony changes, but, because of the lack of appreciation of the normal anatomy of this region and the difficulty of observing the alterations in the bones, the existing changes are usually not detected.

In searching for characterizing diagnostic signs, attention was focused on the following sites: (1) the planum sphenoidale, (2) the limbus sphenoidalis (size and shape), (3) the tuberculum sellae, and (4) the sulcus of the optic chiasm.

An analysis is presented of 7 normal variations elicited in 100 lateral roentgenograms of the base of the skull. In 45 plain roentgenographs of verified meningiomas, definite pathological changes were seen in nearly 50 per cent (23 of 45 examinations). In these 23 positive findings, there were atypical features in the bone anterior to the sella, consisting of a 4 to 6 mm. thickening of the planum sphenoidale immediately in front of the limbus sphenoidalis. In some instances a bony mound-up to almost 1 cm. in height could be visualized. Occasionally, the entire region from the tuberculum sellae to the anterior border of the planum sphenoidale was involved and at other times changes also extended over the most posterior part of the plate of the ethmoid bone. The irregularity and poor definition of the bony structures served to identify the process as pathological even when it simulated one of the normal variations.

The site of origin of tumors clinically designated as suprasellar meningiomas is usually ascribed to the tuberculum sellae. This is not borne out by the present investigation, inasmuch as the changes in the bone in every instance were essentially localized to the tract of the limbus sphenoidalis and only occasionally extended backward as far as the tuberculum sellae. Of 30 verified meningiomas, which from clinical signs were characterized as the olfactory groove type, 7 presented bone changes localized to the planum sphenoidale. Similar thickening of the bone was never found in the olfactory groove; only pressure atrophy was seen.

It is impossible to say whether the 7 meningiomas, which clinically gave the impression of being olfactory groove meningiomas but presented the bone changes characteristic of meningiomas arising from the tuberculum sellae, originated above the planum sphenoidale and later spread in the anterior direction.

EDWARD D. HUDACK, M.D.

Unilateral Calcification of the Basal Ganglia. S. A. TRUFANT and WILLIAM B. SEAMAN. *Radiology*, 1952, 59: 521.

Calcified basal ganglia occur in patients with a history of encephalitis, tuberous sclerosis, toxoplasmosis and mental deficiency dating from birth, and hypoparathyroidism. In all except the last two conditions there are calcium deposits elsewhere in the cerebrum.

A case of unilateral calcification in the basal ganglia, associated with contralateral manifestations of extrapyramidal disease, is reported. The patient is a 33 year old female. Stiffness of the fingers and a rather rigid gait were first observed at the age of 18, and there was a slight increase in severity of symptoms in the ensuing 15 years. Psychological examination revealed signs of intellectual deterioration.

Hypoparathyroidism was excluded by normal blood calcium and phosphorus.

LOIS COWAN COLLINS, M.D.

Abdominal Aortography. TORFINN DENSTAD. *Acta Radiol.*, Stockh., 1952, 38: 187.

A total of 97 patients were studied by abdominal aortography in the Akershus County Hospital and Aker Hospital. The procedures were done under local anesthesia, making it possible to carry out the examinations single handed. The contrast material used was 30 milliliters of 70 per cent nycotrast (equivalent to perabrodil). Several injections of physiologic salt solution during different phases of respiration are recommended to insure that the point of the needle is properly in the lumen of the vessel.

The pathologic changes demonstrated by abdominal aortography are classified as follows:

1. Lesions of arteries, including anomalies, atrophy and hypertrophy. In this group are several renal arteries, aneurysms, and thromboses. Atrophy and hypertrophy of the arteries are indicative of function of the corresponding kidney.

2. Displacement of the arteries in a particular organ, as occurs in hydronephrosis or pyonephrosis, or in cysts, especially of the kidney, but also of adrenal gland and pancreas.

3. Opacification of newly formed pathologic vessels, as occurs in malignant tumors, and this is particularly important in kidney tumors.

4. Displacement of large arteries by retroperitoneal and mesenteric tumors. The method has been disappointing in this group in that the tumors demonstrated have been large and well advanced.

It is suggested that aortography may furnish valuable information in several fields in which the author himself has had no experience with the method, namely, nephrosclerosis, chronic hepatitis

and cirrhosis, thrombosis of the splenic artery and vein, and mesenteric vessels, or emboli therein, strangulated ileus with obstructed circulation, and carcinomatous metastasis in the liver and peritoneum. Aortography in 5 cases of renal tuberculosis showed no changes. LOIS COWAN COLLINS, M.D.

Abdominal Aortography with Special Reference to Its Complications. HARRY LARSSON AND ANDREAS PALMLÖV. *Acta radiol.*, Stockh., 1952, 38: 111.

The possible dangers from the use of radiopaque media comprise: (1) allergic reactions, (2) toxic actions upon the parenchymatous organs, particularly the kidneys and liver, (3) irritation of the intima, and (4) secondary thrombosis.

The contrast medium used in this investigation was either 70 per cent umbradil or dijodon preparations corresponding to diodrast.

In the present series, the danger from allergic reaction was excluded by intravenous urography or arteriography performed on previous occasions. Clinical experience with cardiography, in which 70 per cent contrast medium was rapidly injected in quantities even greater than those used in aortography, attested to the low toxicity of the contrast medium.

Of the 59 patients in whom injection was accomplished, 7 had contrast medium deposited outside of the aorta. Six of these had only mild pain in the back or epigastrium for a day or two. The seventh patient experienced severe pain in the region of the diaphragm for about 3 hours and a milder stabbing pain which lasted for 2 days. No fever occurred, but 2 days following the procedure roentgen examination disclosed a small pleural effusion. Recovery, thereafter, was uneventful. In general, injection of the contrast medium outside the aorta did not in itself appear to cause serious consequences. Attempts to repeat the aortographic procedure were postponed several days whenever extra-aortic injection occurred. It seemed that with experience most of such mishaps could be avoided.

Highly concentrated solutions of contrast medium are known to cause arterial constriction generally and a similar reaction is likely to occur within the kidney itself. Thrombophlebitis had sometimes been observed following the injection of 70 per cent dijodon for mediastinal phlebography. On injection into a large vessel such as the aorta, dilution is very rapid and no mishap is likely. However, in a patient with poor renal function—the same probably applies to liver damage—all or most of the radiopaque solution could be injected into one renal artery and, therefore, in such cases aortography is contraindicated.

On one occasion, a woman 39 years of age with infection of the kidney was injected with contrast medium near the origin of the right renal artery, which artery apparently received the entire amount of 30 ml. of 70 per cent dijodon. Within the month a left nephropexy was performed and later a left nephrectomy. Thereafter, the patient made a progressive recovery. Apart from a temporary lowering of the urea clearance test, no untoward effect from the injection per se was demonstrable.

In another case the needle, directed correctly toward the twelfth thoracic vertebra, was bent and penetrated the aorta at the level of the renal arteries. The clinical result was excellent but the control of the puncture was not considered satisfactory.

In yet another instance a 42 year old man suffering from intermittent claudication showed mild generalized spasm while recovering from anesthesia. Because the spasm existed to a lesser degree during induction of the anesthesia it was doubtful whether the accident could be laid to the injection. The spasm subsided within a few minutes after the administration of 1 ml. of ephedrine solution.

It is common to observe a temporary marked fall in the blood pressure, sometimes down to 70 mm. of mercury systolic, immediately following the injection of the contrast medium. In all cases it has been restored within a few minutes.

The laboratory examinations done to assess kidney and liver function changes incident to the procedure were discussed.

In order to estimate the margin of safety in administering contrast medium in aortography, a 65 per cent solution was injected intravenously into rabbits at a speed of about one-third millimeter per second. The lethal doses in these animals exceeded 7 ml. per kgm. of body weight. These experiments showed that the general toxicity of 70 per cent contrast medium is low and that the lethal dose far exceeds the quantity in use in man.

EDWARD D. HUDACK, M.D

Shortening of the Lesser Curvature in Gastric Ulcer. SYDNEY J. HINDS and R. A. KEMP HARPER. *Brit. J. Radiol.*, 1952, 25: 451.

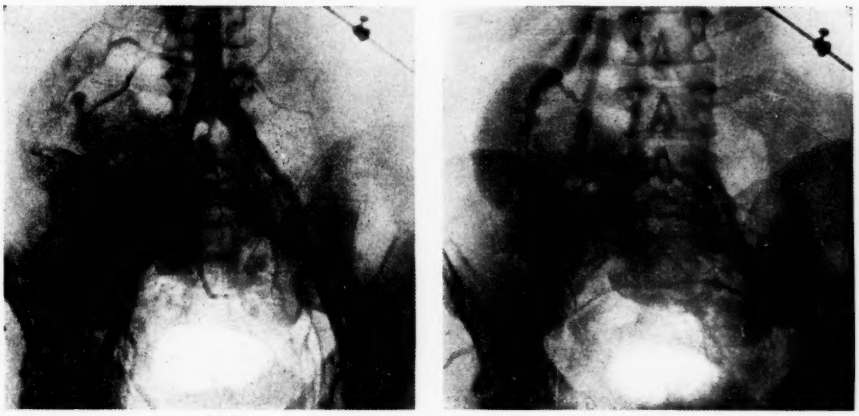
Chronic gastric ulcer may cause marked shortening of the lesser curvature of the stomach with a resultant characteristic deformity. Three types of deformity may be noted. One type is due to fibrous contraction of the stomach wall along the lesser curvature, the second type is the result of fibrosis in the gastrohepatic omentum, and the third type is a combination of the first two types.

The deformity is manifested on x-ray examination by displacement of the pylorus toward the left with a vertical duodenal cap in mild cases, or with a more horizontally placed cap as a spoutlike projection from the stomach in more severe cases. A large pendulous sac develops in severe cases. Then in other cases an incisura develops on the greater curvature as a result of contraction of the gastrohepatic omentum in the pyloric or antral regions.

Pain, vomiting, hematemesis, and gastric retention are generally present. The retention is mechanical in origin because of the pyloric or antral deformity. Gastric emptying is facilitated by placing the patient in the right semiprone position.

The fibrosis and deformity are irreversible. Relief is obtained after subtotal gastrectomy.

JOHN J. GAUGHAN, M.D.



a b

Fig. 1 (Vogler *et al.*). Malformation of the kidney. a, The arterial phase. First exposure showing the atypical renal blood vessels and beginning of the capillary phase. b, The venous phase. Second exposure showing malformation of the kidney clearly, as well as venous drainage by the atypical veins.

Serial Vasography of the Kidneys (Serienvasographie der Nieren). E. Vogler, E. Kahr, and H. Holzer. *Fortsch. Roentgenstrahl.*, 1952, 77: 594.

Serial vasography of the kidneys is of diagnostic value in a number of pathologic conditions. These include retroperitoneal tumors of uncertain origin, and especially pathologic processes of the kidneys in which intravenous or retrograde pyelography does not reveal the character and the extent of the process, as in unilateral hydronephrosis, malformations, and unilateral tuberculosis. This type of examination also permits the differential diagnosis between tumors of the spleen and those of the retroperitoneal space. The vasography is contraindicated in preuremia or uremia, iodine hypersensitivity, marked hepatosis, nephrosclerosis, and other conditions.

Several routes of approach have been described in the literature. The authors inject the contrast material (ioduron or umbradil) directly in the aorta. The technique is described in detail in the article. Under general anesthesia with nitrous oxide a cannula 20 cm. in length is inserted 4 fingerbreadths to the left of the median line at the level of the second lumbar vertebra and directed close to the lateral surface of the vertebral body upward and ventrad until the aorta is reached at the level of L_1 or Th_{12}. Before the vasography is performed 20 c.c. of contrast material are injected to verify that the cannula lies in the lumen of the aorta rather than in a smaller vessel (renal, mesenteric artery). Then 40 c.c. of 70 per cent contrast material are injected and a series of four to six vasograms is taken at intervals of 3 to 4 seconds. This procedure has the advantage that the arterial as well as the capillary and the venous phase of circulation in the kidneys is visualized.

A number of interesting vasograms are reproduced in the article. In tumors and malformations in which pyelography was unsuccessful aortography permitted the establishment of a correct diagnosis. It was, furthermore, of great value in circumscribed kidney tuberculosis in which segmental resection was planned; it enabled the surgeon to visualize the exact size of the process and the course of the blood vessels supplying the involved area, and to plan the operation accordingly.

Werner M. Solmitz, M.D.

Circumcaval Ureter. Wylie H. Mullen, Jr., and William J. Engel. *Radiology*, 1952, 59: 528.

Circumcaval ureter is a congenital anomaly of the vascular system which often causes hydroureter and hydronephrosis. Preoperatively and before autopsy it is diagnosable only by x-ray.

From a review of the 55 cases previously reported, and the report of an additional case of the right-sided type with a single vena cava (the common type), the various types of circumcaval ureter are described as: (1) right circumcaval ureter with single right vena cava; (2) double right vena cava with ureter passing between the two vena cavas; (3) bilateral vena cava with right circumcaval ureter; (4), bilateral vena cava with bilateral circumcaval ureters; (5) bilateral vena cava with double component on the right.

In all of these the ureter is deviated medially. In the single vena cava types, and this includes the common variety, the ureter is deviated to between the midline and the corresponding pedicle, but in the double vena cava type the deviation is somewhat less. All types cause hydroureter and hydronephrosis.

Treatment depends on the degree of hydronephrosis and kidney damage, ranging from conservative

Fig. 1

Fig. 2

Fig. 1 (Leb). Normal lateral roentgenogram of the soft tissues in the region of the knee joint. In the popliteal space overlapping of the semimembranous muscle with the gastrocnemius is clearly visualized. Differentiation of the muscle and ligament shadows by radiotranslucent adipose layers in the retroarticular and prearticular spaces is also apparent. Fig. 2. A case of diffuse periarticular fibrosis. Arteriography shows rarefaction of the branches of the femoral artery and decreased filling of the collateral vessels.

management to nephrectomy, or, if there is sufficient renal tissue to be worth saving, a plastic procedure.

LOIS COWAN COLLINS, M.D.

X-ray Diagnosis of Periarthrosis and Periarthritis

(Die Roentgendiagnostik der Periarthrose und der Periarthritis). A. LEB. *Fortsch. Roentgenstrahl.*, 1952, 77: 525.

The author, director of the Central Roentgen Institute at Graz, Austria, discusses methods of visualization of the soft tissues around articulations, and the usefulness of the roentgenograms in the diagnosis of periarthritic processes in the shoulder and the knee.

The tissues that can be visualized and differentiated include the muscles, tendons, fasciae, and adipose tissue. The degree of absorption of x-rays corresponds to the specific gravity of the tissue. Systematic investigations revealed that small but definite differences exist in the density of the various soft tissues. The specific gravity is 1.06 for muscle, 1.1 for tendon, 0.92 for adipose tissue, and 1.02 for transudates.

To achieve optimal differentiation of the tissues the films should be exposed briefly, the rays should be harder than usual (45 to 48 kv.), and the film should be slightly underdeveloped.

In diffuse periarticular fibrosis and chronic polyarthritis the normal pattern of the soft tissues may be blurred, irregular, or disappear altogether. The shadows of the individual muscles cannot be differentiated from each other because of the thickening of the normally translucent layers between the muscles.

Arthrography with water soluble 30 per cent ioduron may show widening of the glenoid cavity and the bursae as a sign of shrinking of the surrounding soft tissues.

In periarthrosis of the knee, serial arteriography revealed rarefaction of the branches of the femoral artery. Simultaneously with the periarticular fibrosis of the soft tissues, there is a decreased arterial vascularization in the involved area. This could be proved by measuring the resorption time of the ioduron injected in the joint cavity. Whereas normally the contrast material is resorbed within 2 hours, in these cases the resorption was delayed up to 11 hours. On the other hand, in an acute inflammatory process the resorption is markedly accelerated, the contrast material disappearing within 1 hour after injection.

In chronic periarthrosis, fibrosis and degeneration of the prearticular adipose tissue takes place. This is seen in the roentgenogram as thickening and

increase of the connective tissue in the infrapatellar adipose body of Hoffa and the suprapatellar adipose tissue behind the quadriceps tendon. In these cases the ligamentum patellae and the tendon of the quadriceps cannot well be differentiated in the roentgenogram.

A number of instructive roentgenograms are included in the article. WERNER M. SOLMITZ, M.D.

Calcifying Tendinitis of the Shoulder. A Critical Study of the Value of X-ray Therapy. HENRY P. PLENK. *Radiology*, 1952, 59: 384.

Many reports have been published concerning the various methods of treatment of painful calcifications in the region of the shoulder joint. Some authors advocate needling; others, irrigation, or surgical excision; still others regard x-ray therapy as the procedure of choice. Calcifications in the tendinous insertions or in the bursa are easily demonstrated by means of films of the shoulder in external and internal rotation of the humerus. Calcium in the bursa can often be distinguished from calcified tendons.

Thirty-eight patients with the syndrome of peritendinitis of the shoulder were placed under an x-ray machine. In 21 of these patients the shoulders were treated through one field, 10 by 10 or 10 by 15 cm. The treatment factors were: 400 k.v.p., 2 mm. of copper plus 1 mm. of aluminum filter, half value layer 3.75 mm. of copper, 5 milliamperes, 16.2 roentgens per minute in air at 70 cm. focal skin distance. A dose of 150 roentgens in air was given three times on alternate days. In 17 of the 38 patients a 5 mm. lead shutter was left in place during treatment, without the patients knowledge, so that he received no radiation. Equally satisfactory results were obtained in the treated and the control groups; 15 of the 21 treated patients experienced partial or complete relief while 15 of the 17 patients in the shielded control group obtained similar beneficial results. In 7 of the treated and 7 of the shielded patients, restoration of motion of the shoulder was complete at the end of the observation period of 6 weeks. The average period required for improvement or relief of symptoms following therapy was 11 days in each group.

The author believes that calcifying tendinitis of the shoulder is essentially a self-limiting disease in which he has been unable to demonstrate any beneficial effect from radiation therapy.

FRANK L. HUSSEY, M.D.

Discography: Technique, Indications and Evaluation of the Normal and Abnormal Intervertebral Disc. RALPH B. CLOWARD and LOUIS L. BUZAID. *Am. J. Roentg.*, 1952, 68: 552.

Although a large volume of literature on intervertebral disc injuries has accumulated since the work of Schmorl in 1932, comparatively little has been written on the roentgen diagnosis. Lindblom, in 1950, introduced discography consisting of the injection of an opaque medium into the disc by means of direct puncture through the spinal canal. This method yields more comprehensive information than myelography and is now used in place of the latter for confirming suspected lumbar disc lesions.

The authors prefer the following procedure: if the presence of a ruptured disc is strongly indicated by the history and clinical examination, its level is determined by myelography. If such examination gives negative results, discography is then performed.

It is believed that intraspinal protrusion of the disc is a contraindication to discography for two reasons: (1) unilateral protrusion of the disc may displace the roots of the cauda equina toward the midline thereby causing marked pain or even damage when the needle enters in contact with these nerves, and (2) in case of a rent in the posterior fibers of the annulus fibrosus the opaque medium may spread epidurally, producing root pain which persists for 5 to 10 minutes following the injection.

The chief value of discography lies in the fact that it permits the diagnosis of rupture of an intervertebral disc when no intraspinal protrusion is present. The method is also indicated when preliminary roentgenographic study of the spine discloses changes in the vertebrae at the level of the suspected lesion. If the intervertebral space is narrowed, with or without marginal spur formation, discography may serve a useful purpose in verifying or ruling out a suspected rupture of the disc.

The authors give a very detailed description of the technique of injection of the opaque medium into the disc—performed with the patient lying on his side in the lumbar puncture position. They use 35 per cent diodrast; 0.5 to 1 c.c. are injected when the disc is normal and 2 to 5 c.c. when the disc is ruptured, or degenerated. To reduce the pain, 0.5 c.c. of 1 per cent novocain is injected slowly into the disc 3 minutes prior to injection of the opaque medium. Considerable pressure is often necessary to force the diodrast into the normal disc and it is advisable to leave the syringe attached and to apply gentle pressure for 30 seconds to 1 minute after the injection to permit diffusion of the opaque material through the nucleus pulposus. In the ruptured or degenerated disc, the injection is accomplished with much greater ease, little pressure on the syringe being necessary.

The first roentgenograms are made in the lateral position while the patient is still lying on his side, then the needle or needles (in case of several injections) are removed, dressing applied, and the patient turned on his back. For the anteroposterior roentgenograms, the knees are hyperflexed on the abdomen and held wide apart by the patient, and the roentgen tube is angulated 10 to 15 degrees cephalad. Finally, the patient is placed in the standing position, and additional lateral roentgenograms are made to visualize the abnormal disc during weight-bearing. The diodrast is usually absorbed within 20 minutes to 1 hour after the injection, so that too much delay must be avoided in carrying out the procedure.

In the normal disc the opaque medium is confined to the region of the nucleus pulposus, the shape and size of which may be quite variable.

The abnormal disc may show rupture in a single direction or in multiple directions, as, for example, anteriorly, posteriorly, posterolaterally and vertically, and show various forms of degeneration.

The article is profusely illustrated with reproductions of beautiful discograms illustrating various appearances of the normal and abnormal disc. Among these latter are included examples of posterior ruptures with midline or unilateral herniation of disc material, anterior herniations with or without associated posterior ruptures, and vertical ruptures of the nucleus pulposus into the vertebral body (Schmorl's nodule) which often were not suspected from routine roentgen examination of the spine.

The authors conclude that discography is a valuable method of examination which permits unequivocal demonstration of a ruptured disc when all other methods of investigation, namely, routine roentgenography, myelography, and surgical exploration of the spinal canal have failed.

T. LEUCUTIA, M.D.

Skeletal Changes in Myelomatosis, Lymphosarcoma and Osteomyelosclerosis. UMBERTO COCCHI. *Am. J. Roentg.*, 1952, 68: 570.

The author discusses the osseous changes in myelomatosis, lymphosarcoma, and osteomyelosclerosis. Generally they consist of bone defects, osteoporosis, and osteosclerosis.

Myelomatosis. Apitz in 1940 expressed the view that multiple myeloma (Kahler-Bozzolo's disease) is a growth of myeloid plasma cells or their precursors. Accordingly, he suggested that the term "plasmocytoma" or "plasmocytosis" be used for its designation. Based on the site of origin of the lesion, one may distinguish between the medullary type when the osseous system is affected and the extramedullary type when the lesion occurs in the soft tissues, the most common site being the mucosa of the upper respiratory tract.

The age distribution, symptoms, clinical manifestations, hematologic picture, blood chemistry, and electrophoretic patterns of plasmocytoma are considered at some length. The prognosis is unfavorable. The average survival in the author's 38 patients observed at the University of Zurich was 2 years and 1 month, the shortest survival being 1 month, and the longest 14 years.

Anatomically, three types are noted: (1) diffuse infiltration, so-called plasmocytosis, presumably starting from a localized growth, (2) the multiple nodular type, and (3) the solitary type. The first and third types are very rare; usually both pass into the second.

The roentgenographic changes consist of (a) diffuse osteoporosis which occasionally may be the sole osseous manifestation of the disease and (b) osteolytic bone lesions. The latter are characterized by oval or rounded, more or less sharply defined, punched-out transparent areas, varying from the size of a millet seed to an apple. They may appear as a single focus (solitary plasmocytoma) or as multiple foci, all without sclerotic reactions. In the later stages osteoporosis is frequently observed. Pathologic fractures occur in about 40 to 60 per cent of all the cases, especially in the vertebrae, ribs, long bones, and clavicles. The outstanding roentgen feature is bone destruction but sometimes the affected bones are expanded by the tumor (ribs, ischium, and upper femur), and occasionally they may assume a soap bubble resemblance (sternum, clavicle) or cystic appearance (ilium). In order of decreasing frequency, the most common sites of involvement are: the skull, ribs, spine, and pelvis, especially the ischium, pubis, and femur. No difference can be elicited in the roentgen appearance whether the plasmocytoma is solitary or multiple, medullary or extramedullary (metastasis to bone), or in the different globulin groups.

Roentgen therapy produced recalcification in only 4 instances among 26 patients treated. These 4 cases are briefly described.

Lymphosarcoma. Osseous manifestations occur in about 7 to 10 per cent of all cases of lymphosarcoma, usually in the terminal stages of the disease. Their roentgen appearance greatly resembles that of plasmocytoma. One case is cited. In 5 per cent of the cases purely sclerotic lesions are noted.

Osteomyelosclerosis. This condition is described in the literature under a variety of names, such as aleukemic megakaryocytic myelosis, megakaryocytic leukemia, myélose aleucémique ossifiante, and leucoerythroblastic anemia. Rohr suggested the term of osteomyeloreticulosis to express the close relationship which exists between the myeloid and osteogenous reticulum.

The disease is characterized by (1) marked splenomegaly, (2) myelofibrosis, often associated with osteosclerosis, and (3) myeloid blood reaction showing erythroblasts, myeloblasts, and myelocytes. There may be progressive anemia and moderate leucopenia, normal white cell count, or leucocytosis. The general health may not seem impaired for several years but the final prognosis is unfavorable. The mean survival period is 5 years and 6 months.

Until recently, osteomyelosclerosis with few exceptions was identified only at autopsy. Roentgen examination of the skeleton shows extensive osteosclerosis, especially of the vertebral bodies, sternum, ribs, pelvis, the proximal parts of the humerus, femur, and tibia, and the distal part of the femur. The skull may also be affected, but the small bones of the hands and feet are very seldom involved.

Although the bone condensation somewhat resembles that seen in Albers-Schoenberg disease, there is absolutely no connection between the two conditions. Other lesions which may come into consideration from the point of view of differential diagnosis are chronic leucemias, hemolytic icterus, aplastic anemia, generalized carcinomatosis, Camurati-Engelmann disease, and Paget's disease.

The article contains numerous roentgenographic reproductions amply illustrating the salient points of interest.

T. LEUCUTIA, M.D.

Radiologic-Physiatric Studies on the Function of the Lumbar Vertebral Column in the Lumbago-Sciatic Syndrome. E. HASNER, M. SCHALIMTZEK and E. SNORRASON. *Acta med. scand.*, 1952, 143: 315.

The authors studied the relative value of physiatric, conventional roentgenographic and functional roentgenographic examinations for the demonstration of pathologic changes in the syndrome of lumbago-sciatica. Their material comprised 125 cases seen since September, 1949 in various departments and out-patient clinics of Rigshospitalet, the University Hospital of Copenhagen. In 35 cases the technique used for making the roentgenograms was found to be unsatisfactory, therefore they were excluded from the statistical compilation.

The physiatric examination included a study of the following factors: form of the spine on sitting or standing astride (to avoid overbalance and alteration of the spinal pelvis movement); extent of spinal movements on bending forwards, backwards, and sideways from the same initial posture, without torsion or movements in the sagittal plane; degree of direct and indirect tenderness of the spine; presence or absence of atrophy, reflexes, sensory disturbances, myoses, etc.

The conventional roentgenographic examination usually was made in the reclining posture.

The authors' method of functional roentgenographic examination comprised exposures made in a reclining as well as a sitting posture (physiological strain on the vertebral column) with the patient bending forwards, backwards, and sideways. In the frontal plane the fifth intervertebral space was examined with the patient erect to obviate the lumbar lordosis. It was found that on bending sideways the lumbar column forms a smooth arch with its convex surface toward the opposite side and that lines drawn through the upper and lower surfaces of the vertebral bodies form acute angles with their apices in the concave arch. In the presence of pathologic findings only slight angulation, or no angulation, or even "paradoxical" angulation was noted. Forward bending, as is known, results in slight concavity anteriorly, and backward bending results in a pronounced concavity posteriorly. A shift of more than 2 mm. of the vertebral bodies in relation to one another is indicative of a "sliding." In tabulating the positive findings the morphologic changes secondary to the affection of the intervertebral discs were also taken into consideration.

Ten statistical tables are incorporated in the article, giving data relative to age and sex distribution, complaints, duration of symptoms, physiatric findings, roentgenographic findings with respect to functional capacity, comparison of functional roentgenographic with conventional roentgenographic examination and distribution of abnormal angulation and sliding in various groups of patients.

It has been established that in the syndrome of lumbago-sciatica, functional roentgenographic examination permits the most accurate diagnosis. In a series of 90 cases pathologic changes were demonstrated by this method in 78 cases, whereas physiatric examination indicated positive findings in 65 of the 90 cases and conventional roentgenography indicated positive findings in only 41 of 71 cases. Furthermore it has been shown that among 78 patients with abnormal angle formation between the bodies of the lumbar vertebrae, 37 presented merely evidence of myoses and reduced mobility, whereas 27 exhibited morphologic changes suggestive of possible prolapse of the intervertebral discs.

T. LEUCUTIA, M.D

Hip Joint Arthrography. GILBERT W. HEUBLEIN, GERALD S. GREENE, and VICTOR P. CONFORTI. *Am. J. Roentg.*, 1952, 68: 736.

The anatomy of the normal and abnormal hip of the infant is reviewed and correlated with arthrograms made by the intracapsular injection of diodrast. The technique of injection as well as the technique of securing roentgenograms is described.

Though the authors indicate that the most important indication for the use of diodrast arthrograms is in congenital dislocation of the hip, they believe it is also advantageous in old infections of the joint, Legg-Perthes disease, and in any disease of the hip in which roentgenographic interpretation is limited by lack of complete ossification of the capital epithysis and acetabulum.

Diodrast arthrography "provides valuable information regarding the size, shape, and position of the intracapsular soft tissues and cartilage."

Over 40 cases have been studied without any untoward effects. MORTON M. KLIGERMAN, M.D.

Cytological Investigation of the Bone Marrow of Mice after the Administration of Protective Agents and Subsequent X-Radiation. FINN DEVIK. *Brit. J. Radiol.*, 1952, 25: 481.

Experiments were performed on albino mice to determine if the reduction in the radiation sensitivity of the organism by various protective agents is correlated with a reduction in chromosomal injuries of the individual cells. Seven agents, cysteine included, were used in conjunction with x-irradiation.

The mice were given the protective agent intravenously from 25 to 70 minutes before x-irradiation with 200 roentgens from a 170 kv. machine. The effect of hypoxia during or immediately after the irradiation was also studied. Suitable controls were employed.

Fragments of the bone marrow were removed from the femoral diaphyses about 18 hours after irradiation. These fragments were studied for various chromosomal injuries or changes in the anaphase stage of mitoses.

The preradiation cysteine, glutathione, thiocholine, thiourea, ascorbic acid, methylene blue, and vitamine B12 caused no significant reduction in chromosomal injury over the controls.

However, hypoxia during irradiation produced a marked reduction in the chromosomal injury in the

mice as compared with the controls. Postirradiation hypoxia showed no changes from the controls.

The conclusion is that cysteine and other protective agents which reduce the mortality rate after irradiation do so by their effect on the cystoplasm, whereas hypoxia exerts its effects specifically on the chromosomal mechanism. J. J. GAUGHAN, M.D.

MISCELLANEOUS

Studies in Optimum Dosage. The Mackenzie Davidson Memorial Lecture. RALSTON PATERSON. *Brit. J. Radiol.*, 1952, 25: 505.

The author attempts to establish a scientific footing for the choice of an optimum dosage in radiation therapy of malignant disease. The term "dosage" is used in its widest sense, embracing three factors: (1) the quantity of radiation actually given, (2) the time over which that quantity is spread, and (3) the volume of tissue irradiated.

In considering the volume of tissue to be treated, two basic concepts compete for attention. On the one hand, surgical experience calls for wide excision of malignant disease, while on the other hand, the greater the volume irradiated the lower the dose which can be given without exceeding tolerance limits.

Illustrating his concept of optimum volume, the author cites his experience in Manchester, England, with mouth cancers treated between 1932 and 1941. The earliest system of treatment with radium implantations in relatively small volumes and without inclusion of a wide margin of "normal" tissue yielded 5 year survivals in 46 per cent of the material. During the years from 1934 to 1937 volume implants designed to leave a substantial margin around visible tumors were used and yielded 5 year survivals in only 38 per cent. Beginning in 1938, the irradiated volume was reduced to the "minimum reasonable even at the risk of geographic miss." The 5 year cure rate jumped to 48 per cent. The author therefore concludes that small volume irradiation outweighs the safety of adequate margin.

The next study concerned time, i.e., the over-all time of a course of radiation. In this instance three groups of cases of both mouth and laryngopharyngeal cancers treated with beam directed x-ray therapy were studied. One group treated over a short period of 1 to 8 days yielded very little success. There was no significant difference between the two groups treated for 3 weeks and 5 weeks, respectively, however. The conclusion is drawn that the optimum time range is from 3 to 6 weeks. No convincing material is presented to indicate that a longer time period is detrimental.

In connection with the time factor, the author presents two graphs based on his clinical experience which attempt to portray the equivalent biological dose with varied time factors, e.g., 6,000 roentgens in 5 weeks is equivalent to 5,500 roentgens in 3 weeks.

Finally, the problem of quantity or dose of radiation is considered. Here two approaches are used: (1) the survival rate, and (2) the incidence of "high dose effects." The author cites the experiences of Margaret Todd (*Acta radiol.*, 1947, 28: 566) in the treatment of cancer of the cervix with x-rays and radium. In this study two clear-cut trends stood out. First, as the dose is increased, results improve up to a critical point—in this particular case 7,000 roentgens of radium plus 3,000 roentgens of x-rays. Thereafter, with further increase in dose the results deteriorate. Second, as one would expect, the incidence of necrosis or high dose effects increases roughly pro rata. The striking point, however, is that even if we are willing to risk the price of high dose, of itself not lethal to the patient, we do not thereby increase the survival rates as, instead, they actually fall. This relationship expresses the concept of a "supralethal" dose.

The author then cites his own experience with cancers of the mouth, tongue, larynx, and lip, which tends to corroborate the studies of Todd. He stresses, however, the selection of a dose below that which results in the appearance of "high dose effects."

The conclusion is that there is, in some fields of therapy, evidence of a trend toward an optimum dosage which might be appreciably better than either a little more or a little less, and may be quite critical.

GLADDEN V. ELLIOTT, M.D.

Diagnostic and Therapeutic Application of Radioactive Iodine (I 131) Die diagnostische und therapeutische Anwendung des Radiojodids (131 J). W. HORST. *Fortsch. Roentgenstrahl.*, 1952, 77: 567.

The author, of the Radiology Department of the University of Hamburg, Germany, discusses in this article the metabolism of iodine, and the diagnostic and therapeutic application of radioactive iodine (I 131). This interesting article should be studied in the original.

Two phases are distinguished in the iodine cycle: the iodide and the thyroxin phase. During the iodide phase, orally or intravenously given iodine is either stored in the thyroid or excreted by the kidneys. This phase is completed within hours. During the thyroxin phase the stored iodine is changed into organic compounds in the thyroid; these compounds are, in the course of several days to several weeks, secreted from the thyroid into the blood circulation mostly in the form of thyroxin. These organic iodine compounds are again broken down in the tissues to iodides; the anorganic iodides return to the thyroid via the blood circulation, and the iodide phase of the cycle begins again.

The course of both phases is determined by the functional state of the thyroid. In hyperthyroidism as well as in hypothyroidism one or both phases of the cycle show characteristic changes. It is usual to test the iodide phase only for diagnostic purposes. However, the author emphasizes that testing of both phases gives much more reliable results. Furthermore, he criticizes measuring the amount of stored iodine only once, 24 hours after the application of the radioactive iodine.

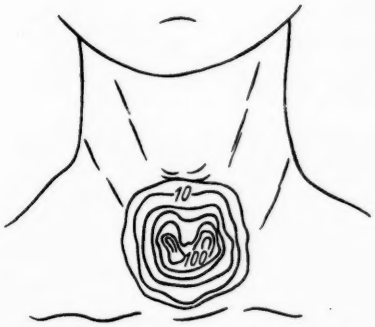


Fig. 1 (Horst). Picture of a normal thyroid. Points with an equal number of impulses are connected by lines. Isoimpulse diagram of the thyroid.

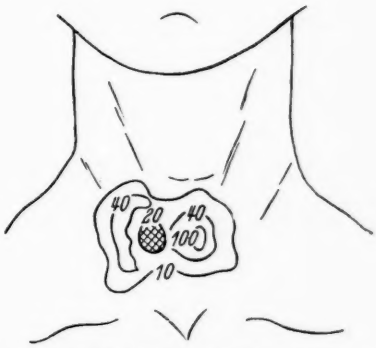


Fig. 2. Isoimpulse diagram of a thyroid with a cherry stone-sized node in the right lobe, which histologically turned out to be a carcinoma.

The following "two phase test" is used in his institute:

After the application of 0.05 to 0.1 mc. of I 131 the amount of iodine in the thyroid is determined after 2, 24, and 48 hours, and, in certain cases, again after 7 days, and the radioiodine content of the plasma is determined after 2 and 48 hours. This method permits determination of the amount of iodide as well as of the thyroxin phase. The normal level of radioactive iodine in the serum does not exceed 0.4 per cent of the ingested iodine per 1,000 c.c. of serum. Higher levels indicate hyperthyroidism. In thyrotoxicoses under treatment only the 2 hour test should be used for determination of the iodide phase as the 48 hour test often gives a wrong picture in these cases.

A single test establishes only a cross section of the functional state of the thyroid at a given time. Only repeated testing at intervals of several weeks provides a true picture; whereas in normal persons the thyroid function is remarkably stable, in thyroid pathology the levels vary considerably.

The analysis of 1,200 "two-phase tests" gave the following results:

1. In 155 patients with clinical hyperthyroidism and elevated basal metabolism rate the findings were elevated in 100 per cent.

2. In 21 patients with clinical hyperthyroidism but a normal metabolic rate, the findings showed elevation in all cases.

3. In 75 patients with normal thyroid function the thyroxin phase always showed normal values whereas the iodide phase was elevated in 16 per cent.

4. In 28 patients with a markedly elevated metabolism rate due to extrathyroid pathology (leucemia, polycythemia, large neoplasms) the radioiodine tests always showed normal values. This is clinically important for the differential diagnosis between thyroid and extrathyroid pathology.

In hypothyroidism the tests are less dependable: in 75 per cent of myxedema cases the iodide clearance and the radioiodine intake was markedly reduced; however, 25 per cent gave normal values.

Furthermore, radioactive iodine permits the localization of tumors in the thyroid. The amount of gamma rays are measured at different points and recorded on a system of co-ordinates. This permits determination of the size and location of a tumor or other pathological condition much more accurately than is possible by palpation.

Finally, the author discusses therapy with I 131 in hyperthyroidism and in tumors. One hundred patients with hyperthyroidism were observed for periods of 6 to 24 months after radioiodine treatment. In 92 of these the treatment was successful; 3 of the group developed hypothyroidism because of overtreatment.

The course of the two phase tests after completion of the radioiodine treatment in these cases was of special interest: the iodide phase showed normal values, a considerably smaller proportion of the ingested iodine being stored in the thyroid than before the treatment. Surprisingly, however, in 71 per cent of the clinically normalized patients the thyroxin phase continued to show considerable acceleration of the thyroxin secretion. WERNER M. SOLMITZ, M.D.

The Reticuloses and Lymphoreticular Sarcomas from the Radiotherapist's Point of View. MARGARET C. TOD. *Edinburgh M. J.*, 1952, 59: 457.

Reticulosis is a name applied to certain forms of neoplasia which appear to be multifocal in origin and produce characteristic symptoms of systemic disturbance. When the true sarcomas of lymphoid tissue are included, whether they be differentiated or anaplastic, the term lymphoreticular neoplasia is more accurate.

The author, for the purpose of discussion, has regarded the following pathological reports as indicating the presence of reticulosis or lymphoreticular neoplasm: Hodgkin's disease or lymphadenoma, Brill-Symmer's disease or lymphoid follicular reticu-

losis, leucemia, lymphosarcoma, reticulum cell sarcoma, anaplastic sarcoma, and cases with such doubtful reports as "anaplastic tumor may be either sarcoma or carcinoma. The material available for analysis was provided by the cases treated at the Christie Hospital, Manchester during the 8 years from 1940 to 1947 on the diagnosis of "reticuloendothelial neoplasia" which was adopted by the radiotherapists at this hospital in 1937. The cases were grouped as Hodgkin's disease—275 cases, Brill-Symmer's disease—24 cases, lymphosarcoma—108 cases, reticulum cell sarcoma—57 cases, anaplastic tumors (either sarcomas or carcinomas)—156 cases, and leucemias—157 cases.

The author took two conditions, Hodgkin's disease and Brill-Symmer's disease, so distinct in character that they can be easily recognized, but showing a family resemblance strong enough to prove a relationship, and compared them with 3 tumors of varying histological type brought together as another family whose ancestry is the same but whose development is different. The members of the first family were reticuloses affecting the lymph nodes and only involving other tissues and organs at a late stage of the disease. Their systemic manifestations played an important part in the prognosis. The second family consisted of malignant tumors arising in, or in association with, lymphoreticular tissue infiltrating locally and producing secondary deposits in the lymph nodes and distant metastases. Between the two families were some of the transition forms mentioned by Willis, and in the second family some atypical members were found which might have been intruders from another family altogether, the carcinomas.

This did not alter the fact that it is now possible to separate this apparently heterogeneous collection of neoplasms into two main groups. One of these consists of lymphoreticular disease multifocal in origin in the sense that all lymphoreticular tissue in the body, either simultaneously or in an order which cannot be predicted, responds to an unidentified stimulus by hyperplasia going on to neoplasia. The other consists of a group of malignant tumors, mainly lymphoreticular sarcomas but including some completely anaplastic growths, which are unifocal in the sense that there is a primary tumor which gives rise in the ordinary way to secondary deposits in the lymph nodes and distant metastases.

If this essential contrast is accepted it is not surprising that the groups call for different treatment and respond differently to the treatment given.

1. All localized tumors with pathological reports suggesting that they may be lymphoreticular sarcomas should be treated by regional x-ray therapy to full dosage. This can save at least 40 per cent of the localized cases.

2. The treatment of generalized lymphoreticular tumors, true reticuloses, and sarcoma should consist, in the first place, in palliative x-ray therapy which should aim at conserving the general tolerance of the patient.

3. Chemotherapy may be a useful adjunct but should be restricted to the later stages.

4. A biopsy is essential when lymphoreticular neoplasia is suspected. FRANK L. HUSSEY, M.D.

Teleradium Treatment of Laryngeal Carcinoma at Radiumhemmet, Stockholm. FOLKE JACOBSSON. *Acta radiol.*, Stockh., 1952, 38: 143.

To date there has been rather definite agreement regarding the suitability of radiation treatment for tumors of the larynx that can be operated on by laryngofissure and excision. The results appear to be the same with both methods. It is principally when the tumor is widespread and laryngectomy is the only surgical procedure which presents a prospect of its removal that opinions regarding the employment of irradiation differ.

Since laryngeal carcinoma affects mainly males, and these at their most active ages, laryngectomy for many of these men means inability to carry on their previous occupation. It would be of great importance to be able to treat carcinomas of the larynx selectively with the assurance that irradiation would give equally as good chances of permanent cure as laryngectomy.

A group of 178 patients with laryngeal carcinoma treated between 1935 and 1945 was analyzed. In 106 patients the tumor was treated primarily by radiotherapy (teleradium) and in an additional 72 patients the treatment was surgical with irradiation.

The criteria for acceptance of surgery were based on the classification of Frenchner and Ahlbom.

The teleradium therapy was accomplished with a 5 gm. unit with 6 mm. lead, equivalent filter, a 6 cm. radium-skin distance, circular treatment fields (three in number and each one 5 cm. in diameter). In general, three treatment fields were used, one on each side of the larynx and one in front. One field was treated daily with a skin dose of 1,000 roentgens, with an over-all treatment period of 12 to 19 days and a tumor dose usually between 6,000 and 6,500 roentgens.

Necrosis of the skin did not develop in any instance. The skin after 10 years had remained supple, soft, and movable. A moderate degree of telangiectasia was present as a permanent change.

Postoperative teleradium therapy following laryngectomy was given through two fields on each side of the neck, each area receiving a total skin dose of 3,000 to 4,000 roentgens.

If the number of patients dying from intercurrent disease was not deducted from the survivors, the 5 year survival rate was 51 per cent for the combined series. If it was deducted, the net 5 year survival rate was 57 per cent. By radiotherapy alone, a 5 year survival of 40 per cent of 106 carcinomas was obtained; a net 5 year cure rate of 44 per cent. In the group in which primary laryngectomy was performed and postoperative radiotherapy was carried out, 64 per cent of the patients were 5 year survivors. We are reminded, however, that the data in the "primarily" irradiated group and the "primarily"

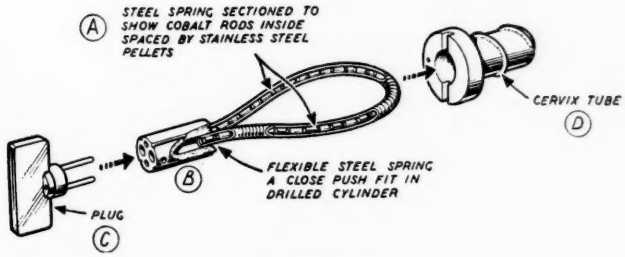


Fig. 1 (Jones)

operated group were not directly comparable because all inoperable patients were included in the latter. EDWARD D. HUDACK, M.D.

A Flexible Linear Gamma Ray Source (Co^{60}) for the Treatment of Cancer of the Uterine Body. D. E. A. JONES. *Acta radiol.*, Stockh., 1952, 38: 41.

The methods currently in favor for the gamma ray treatment of cancer of the uterine body involve either the insertion of a single linear radium source into the uterine canal or filling the uterine cavity with a large number of relatively small separate radium units. The first method results in an unfavorable dosage distribution and the second method unfortunately requires a multiplicity of special apparatus and of radiators, the insertion of which carries the risk of perforation.

A line of attack which seemed both feasible and promising was to introduce into the uterine cavity through the cervical canal, a linear gamma ray source in the form of a very flexible loop which, after passing the internal os, would expand so as to press against the lateral walls and the fundus of the uterine cavity.

The apparatus selected consisted of a length of stainless steel wire, 0.56 mm. in diameter, which was wound into a close helix of the required length (usually about 15 cm.) and 3.75 mm. in outside diameter. Its ends are pushed into corresponding holes in a brass cylinder. The loop thus formed acts as a flexible container for the gamma ray sources. When the loop is compressed laterally, it may be passed through the "cervix tube" into the uterine cavity.

In order to obtain the desired dosage distribution and retain the mechanical flexibility of the apparatus it was decided to use radioactive cobalt (Co^{60}) wire 2 mm. in diameter in lengths of 3.4 mm. Each individual source then contained 2.8 mc. The sources were electroplated all over to a thickness of 0.1 mm. of nickel to absorb the 0.3 million electron volts B rays and help in eliminating the toxic tissue reactions involved in the interstitial use of bare Co^{60}.

A full dosage survey in the two principal planes of the applicator was then made with the loop length adjusted to correspond to an 8 cm. long uterine cavity. The total load was 74 mc. with the tip or fundic portion of the loop containing 6 contiguous cobalt sources and the remainder filled with alternate sources and 4 mm. long stainless steel spacers.

With this loading, a minimum dose of 6,000 roentgens was delivered to a closed surface at a uniform distance of 1 cm. from the midtransverse plane of the uterine cavity in 43 hours. The corresponding maximum dose for this plane was 10,000 roentgens with the average probably nearer the lower value. The maximum dose at the applicator surface occurred at the tip of the loop and at the internal os and was about 45,000 roentgens in each case. The isodose distribution conforms rather closely to the dimensions of the uterine cavity.

As would be expected from the "linear" form of the source, the dosage distribution is practically independent of the length of the loop, provided the linear intensities employed remain unchanged.

The Co^{60} sources must be reactivated every 12 months since at the end of this time, the loss of activity corresponds to 12.3 per cent and the time for treatment reaches 49 hours.

The applicator was used for the radical gamma ray treatment of 5 cases of uterine body cancer over a period of 12 months. Long term follow-ups are not available but to date the response has been satisfactory and no radionecrosis has developed.

GLADDEN V. ELLIOTT, M.D.

Comparative Study of Various Radiation Methods as Adjuncts to Surgery in Carcinoma of the Corpus Uteri. T. LEUCUTIA. *Am. J. Roentg.*, 1952, 68: 770.

During the past decade the literature on the treatment of carcinoma of the corpus uteri has analyzed the various methods of irradiation and their scope in relation to critically evaluated surgical procedures. The recent trend toward extremely radical operative intervention in all types of cancer is considered to justify the presentation of long range statistical studies of the author's large groups of cases treated along more conservative lines.

From 1924 to 1945, inclusive, 240 patients with carcinoma of the corpus uteri were treated at the Harper Hospital, Detroit, Michigan, by means of roentgen therapy, intracavity radium, and surgery in various combinations. Therapy methods were changed over the years so the statistical analyses have been grouped into three periods. Period 1 extended from 1924 to 1932, period 2 from 1933 to 1936, and period 3 from 1937 to 1946.

The 5 year survival rates in the patients treated by the method of preoperative intracavitary radium plus roentgen therapy followed 6 weeks later by panhysterectomy and in most instances by one or two additional courses of roentgen therapy were as follows for the three aforementioned periods: 80 per cent for period 1, 80 per cent for period 2, and 82 per cent for period 3, corresponding to an average of 81.2 per cent.

The method consisting of panhysterectomy associated with only postoperative irradiation gave for the same periods: 46 per cent for period 1, 63 per cent for period 2, and 45 per cent for period 3, or an average of 47.8 per cent.

The ratio of the cases treated by the two methods was: 1 to 5.2 per cent for period 1, 1 to 2.2 per cent for period 2, and 1.6 to 1 per cent for period 3. The total cases operated upon constituted 58 per cent for period 1, 46 per cent for period 2, and 58 per cent for period 3.

Irradiation alone, usually consisting of two courses of intracavitary radium and external roentgen therapy, gave the following 5 year survival rates in the inoperable cases for the three periods: 32 per cent for period 1, 37 per cent for period 2, and 48 per cent for period 3. In period 1 deep roentgen therapy was used, in period 2 the cases were treated in equal proportion with deep roentgen therapy and supervoltage therapy, while in period 3 supervoltage roentgen therapy was used exclusively. The author believes that supervoltage roentgen therapy improved the over-all results.

FRANK L. HUSSEY, M.D.

The Cause, Incidence, and Treatment of Irradiation Injuries in the Female Pelvis. GRAY H. TWOMBLY, EDUARDO CACERES, and JAMES A. CORSCADEN. *Am. J. Roentg.*, 1952, 68: 779.

Radium was first used as a method of treating cancer of the uterine cervix at the Sloane Hospital, New York, New York, in 1917. The method was rather crude so that there were four fistulas produced, three in the bladder and one in the rectum. From 1932 to 1934, four bladder fistulas and one rectal fistula are recorded as a result of over-treatment by external irradiation. Since 1934, three fistulas have appeared, which may have been produced by over-irradiation, in each case by the introduction of needles. All other fistulas have resulted from the uncontrolled growth of cancer.

Of 725 patients with cancer of the cervix treated at the Sloane Hospital from 1917 to 1945, 13 developed fistulas which could be attributed to irradiation; 10 of these were vesicovaginal and 3 rectovaginal.

In 3 series of cases treated at Memorial Hospital, New York, in which the radium application was kept uniform, bladder injuries varied from 9 to 21 per cent, in accordance with the amount of external irradiation reaching the parametria. The highest rate of injury was found in a fourth group showing the highest rate of cure, 113 cases treated by multiple small doses of external roentgen therapy to six pelvic portals, multiple treatments through the vagina in three directions, and a radium tandem for 3,000 milligram hours. In this group there were 10 radiation ulcers of the bladder, and 6 cases of hematuria or chronic irradiation cystitis. Rectal injuries also varied with the dose of external roentgen therapy from 5.5 to 11.8 per cent; the more aggressive the treatment, the higher the rate of complications.

Bladder ulcers heal with time; the symptoms are relieved in most cases by appropriate antibiotics. Fistulas are usually closed successfully by a plastic operation previously described, a vaginal patch in the defect plus colpocleisis. Fifteen such cases have been done.

Intestinal injuries include infrequent damage to the colon and small intestine (the treatment of which requires major intestinal surgery) and proctitis with or without ulceration. Potassium permanganate irrigations are of considerable benefit in chronic proctitis. Severe and prolonged bleeding may require colostomy, or even rectal resection. Rectovaginal or vesicovaginal fistulas occur most frequently as the result of the uncontrolled growth of cancer of the uterine cervix. Those attributable to radium and roentgen therapy are due to the faulty application of these agents with either too high a dose in a small area, too high intensity over a short time, or repeated treatment of recurrences in areas which have already received heavy doses of radiation.

FRANK L. HUSSEY, M.D.

MISCELLANEOUS

CLINICAL ENTITIES—GENERAL PHYSIOLOGICAL CONDITIONS

Histochemical Studies of Human Skin Autografts and Homografts. R. J. Scothorne and J. S. Tough. *Brit. J. Plast. Surg.*, 1952, 5: 161.

In this study serial biopsies were taken from 2 patients who had received large split-skin grafts for the replacement of skin lost by burning. Each patient had received three different grafts, including an autograft and two homografts from unrelated donors. These grafts were each biopsied at intervals through the twentieth day and examined by histochemical techniques for glycogen and ribonucleic acid as well as in hematoxylin-stained and eosin-stained sections.

The changes in glycogen and ribonucleic acid in the autografts and homografts closely paralleled each other through the tenth day after grafting. There was considerable thickening of the epidermis of both the homografts and autografts. The ribonucleic acid content increased and glycogen appeared in the epidermis although it had been practically absent at the time of grafting. Glycogen in the basement membrane increased.

On the fifteenth day, however, biopsies showed the homografts to be breaking down and on the twentieth day the homograft epidermis was completely destroyed. Glycogen remained in the basement membrane.

The autografts, on the contrary, had resumed a more normal appearance at fifteen days as regards their histologic appearance as well as their glycogen and ribonucleic acid content and distribution.

The authors conclude that while the factors determining glycogen accumulation in grafted epidermis are obscure, it would seem that there is no disturbance in the ability of the homograft to synthesize glycogen, and that death of the homograft cells was not due to lack of carbohydrate reserves. Cytoplasmic ribonucleic acid is held to be directly involved in protein synthesis. It is evident, then, that during the initial latent phase prior to the destruction of the homografts there is no disturbance, detectable by histochemical methods, of the mechanism of protein synthesis of the homografted epithelium. The authors discuss the possible role of ribonucleoprotein in the mechanism of homograft destruction.

Jeffrey Ferris, M.D.

Magnesium Metabolism in Surgical Patients: Exploratory Observations. B. W. Haynes, Jr., E. Stanley Crawford, and Michael E. DeBakey. *Ann. Surg.*, 1952, 136: 659.

The authors present some interesting observations in studying the behavior of magnesium within the electrolyte framework as related to surgical stress. This investigation was undertaken in an effort to clarify some unanswered questions concerning magnesium metabolism, and with the possibility in mind that magnesium excretion may be subject to control by similar mechanisms as found in the sodium and potassium metabolisms and that magnesium may be so altered during and after surgery as to become of clinical significance.

The distribution of magnesium in the body is similar to that of the cation potassium. Its extracellular concentration is quite small (1.4 to 2.5 mEq./L) and its intracellular quantity is second only to potassium, the major intracellular cation. The principal dietary source of magnesium is green vegetables. Magnesium is chiefly absorbed from the stomach; it is known to activate phosphatase enzymes and is of importance in carbohydrate metabolism.

In their studies the authors found that there is a pattern of magnesium excretion in the urine preoperatively and postoperatively in that the excretory control of urinary magnesium is influenced, or can be influenced, by the adrenal cortex in the same manner that sodium retention and increased potassium excretion follows surgery.

The influence of ACTH on the urinary excretion of magnesium, sodium, and potassium was observed and the data suggested that the excretion of magnesium is similar to that of sodium in that it is retained after ACTH therapy with an increased excretion several days later. Magnesium is closely related physiologically to sodium by virtue of apparent similar excretory control. The relationship of serum and urinary magnesium in surgery was observed and it was found that urinary magnesium tends to decrease until the fifth postoperative day when an abrupt rise occurs. There appears to be a tendency for decreased sodium and increased potassium excretion during this same period. These observations did not appear to be related directly to urinary outputs since the larger urine volumes were not associated with larger electrolyte excretions nor was the reverse true.

Serum magnesium generally tends to reciprocate with urine magnesium, in that the serum level rises with urinary retention and falls as increased excretion occurs.

It was suggested that further studies of the magnesium metabolism should be encouraged before any final conclusions are made.

John E. Karabin, M.D.

Results of Thymectomy in the Treatment of Myasthenia Gravis (Resultados de la timectomia en la tratamiento de la miastenia gravis). Mario M. J. Brea, Andrés A. Santas, and Jose L. Martinez. *Bol. Trab., Buenos A.*, 1952, 36: 531.

The authors present 24 cases in which the following indications for thymectomy were found: (1) cases refractory to medical therapy; (2) thymus tumor discovered on roentgenography of the chest; (3)

failure of the patient to respond to maximum doses of prostigmin; (4) acute crisis of myasthenia gravis, threatening life; (5) in patients over 50 years, rapid progression of the condition, suggesting the possibility of thymus neoplasm; (6) for economic reasons, when the patient must earn a livelihood, even though his life is quite tolerable during repose.

Mediastinal pneumography and tomography were employed to detect tumefaction. These measures were not always successful as, at operation, the heaviest thymus weighed 20 gm., and occasionally only a rudimentary barely perceptible mass was encountered.

The approach was by sternotomy, with use of a Lebske knife. Blood loss was controlled to some extent by hemostatics and averaged 500 c.c. Technically, the greatest hazard is pleural laceration, which, if bilateral, may jeopardize the patient's life even when it is recognized and repaired during surgery. Retrosternal drainage was routine for 48 hours. Postoperatively, minimum doses of prostigmin were used to avoid sialorrhea. The greatest complication was aspiration due to faulty deglutition, resulting in severe respiratory embarrassment.

Three patients died immediately after operation; 1 patient experienced no change in prostigmin requirements; 4 patients were improved in that the quantity of prostigmin required was slightly reduced; 7 patients were markedly improved in that all clinical signs were controlled with relatively small doses of prostigmin; 7 more were in excellent condition and required no prostigmin postoperatively. Three cases of malignancy were found in the entire series. MIGUEL DROBINSKY, M.D.

The Cause and Treatment of Leg Ulcers. S. T. ANNING. *Lancet*, Lond., 1952, 263: 789.

The author reviews his experience with 715 patients suffering from the kind of ulcer affecting the lower third of the leg and variously known as varicose, stasis, or gravitational ulcer. In a brief historical survey it is noted that Gay in 1868 recognized that ulceration is not a direct consequence of varicosity; he was the first to introduce the term venous ulcer and also the first to describe arterial ulcer caused by obliterative disease of the arteries. The pumping action of the muscles of the lower extremities is described. Thrombosis of the deep veins of the legs, valvular incompetence, and lack of muscular contraction, as in long standing in one position, arthritis, and muscular weakness may all interfere with the action of the leg muscle pump. This malfunction results in edema of the limb and eventually pigmentation, induration, and ulceration. Varicosity in the leg with efficient valves and deep veins does not result in edema. In cardiac, renal, and lymphatic edema the complications seen in venous insufficiency do not arise. In cardiac edema the venous pressure is raised but the valves in the deep veins protect the lower limbs against this rise except during systole of the leg muscle pump. Cardiac edema is not caused by rise in venous pressure but rather by reduced renal blood flow with retention of salt and water. In chronic renal disease with edema the venous and capillary pressures are not raised and edema results from reduction in the osmotic pressure of the blood because of the loss of serum protein. In lymphatic edema there is no rise in venous or capillary pressure but fluid is retained because of lymphatic blockage and the high protein content of the tissue fluid. In chronic venous insufficiency, on the other hand, the venous and also capillary pressure is greatly increased. There is considerable capillary damage and extravasation of fluid containing protein and blood cells into the tissues resulting in induration of the limb and impaired metabolism. Capillary thrombosis occurs and is later followed by necrosis. With long-standing chronic venous insufficiency lymphatic obstruction is also present. The author believes that probably high venous pressure and resulting capillary changes, and not venous stasis, are the essential causes of these leg ulcers. Tissue metabolism can be affected only by the capillary circulation and not by venous stasis even were it present. Chronic venous insufficiency, therefore, may be brought about by thrombosis in the deep veins with or without recanalization; by primary varicosity of the deep veins usually accompanied by incompetent perforating veins and superficial varicose veins causing true "varicose ulcers"; and by lack of muscular contraction. Arteriolar occlusion with hypertension and arteriosclerosis obliterans without hypertension have been listed as the causes of leg ulcers due to arterial disease. The ulceration is usually at the junction of the middle and lower thirds of the leg; it is bilateral and symmetrical with much pain which is not relieved by rest in bed. Pulsation of the main vessels of the leg is usually present. Improvement is said to follow sympathectomy.

In the author's series, 79 per cent of the patients had postthrombotic ulcers and slightly over 7 per cent had true varicose ulcers. One per cent had ulcers from arthritis alone and in 10 per cent the cause of venous insufficiency was doubtful. The author notes the association and possible significance of hypertension, obesity, and occupation. The author believes that the use of anticoagulant therapy in the presence of thrombosis is useful together with firm support of the limb to prevent the appearance of secondary varicose veins and to control the edema. Adequate elastic support is held to be sufficient for early signs of chronic venous insufficiency and the value of surgical treatment of superficial varices is doubtful and is thought sometimes to precipitate ulceration. Once ulceration has occurred, rest of the leg and of the entire patient, compression of the limb to abolish edema, and the local treatment of the ulcer in cases of infection are essential. The author believes that ligation of the saphenous veins may benefit temporarily a few patients with true varicose ulcers but the seat of the trouble is in the deep and communicating veins and relapse is common. In 8 patients ligation was noted to be the precipitating cause of ulceration. On theoretical grounds he be-

lieves that the rational surgical treatment would be the introduction of an artificial valve of plastic or metal in the ileofemoral vein. Sympathectomy is believed to be indicated when arterial disease is present and excision of the ulcerated area followed by grafting is occasionally indicated when much sclerosis is present and the ulcer is bound down to deeper structures. After care is necessary to prevent relapse.

ALLAN D. CALLOW, M.D.

Treatment of Hemangiomas. JAMES BARRETT BROWN and MINOT P. FRYER. *Arch. Surg.*, 1952, 65: 417.

From the care and study of a large group of patients with hemangiomas of wide variety in location, duration, former treatment, pathology, and requirements for treatment, and the presenting of many problems of repair of destructive processes, surgical removal, and radiation lesions, observations thought to be of importance are outlined.

Bright-red arterial hemangiomas require careful and prompt treatment in most instances. These bright-red growths occur early in infancy and are possibly true neoplasms, whereas purely congenital types, such as port-wine stains and the bluish cavernous lesions, are possibly anomalies of formation of the skin, or the vessels, or both. These usually do not take on neoplastic tendencies, except occasionally later in life.

These bright-red growths usually start as small areas and may increase rapidly in size, so that a whole feature of the face may be destroyed while some plan of "wait and see" is being followed, or some hope of retrogression is held.

The important point is that if these bright-red arterial hemangiomas could be recognized as dangerous when they first occur as small lesions, they could be dealt with easily by simple excision or cautery removal, or by minimal interstitial radiation therapy with gold radon seed of 0.1 mc. content or less, as has been reported.

When the tumor is of some size, the same procedures as described above can be carried out with sometimes a staged plan of treatment: (1) control of the growth with interstitial gold radon seed, and (2) secondary surgical excision and repair, as indicated, of any remaining scarred surface or deformity.

The dose advocated here is so low it may seem at variance with other recommended doses of 0.25 to 0.5 mc., but this higher dose is too likely to result in late changes to warrant its use in the treatment of these tumors. This is not true of other, more destructive or dangerous tumors. The main hope in cases of these neoplasms is to control the tumor but leave the supporting tissue intact, with the chance for the most normal development. Intractable growths, especially on flat surfaces, may require wide, deep excision and immediate or secondary skin grafting.

The port-wine stain is not subject to relief by irradiation, and some of the worst burns that have been seen requiring repair have come from the treatment of such lesions with radiation.

Cavernous hemangiomas, which are areas of large channels containing mainly blood on the venous side of the circulation, seem to be anomalies at first but later in life may take on extension and enlargement and actually endanger life from position or injury.

These growths do not respond to radiation very well, but partial control may be secured from the small interstitial dose. They may also be excised if situated so that this may be carried out. The injection of sodium morrhuate has given some excellent retrogressions, if not complete cures.

Multiple-suture obliteration of these cavernous growths has been used to good advantage for several years, but, owing to limited observation, has not been reported. The effort in this procedure, again, is to control the lesion but to leave the supporting structures or features intact.

Lymphangiomas or hygromas are mentioned as being somewhat related and as possibly having venous connections or involvements. They are not neoplastic, except for enlargement, deforming areas, and contour anatomy. They are dealt with by excision, injection, packing, control of venous connections, and multiple-suture procedures.

Solid endotheliomas, or hemangioendotheliomas, are of a more neoplastic nature and may require microscopic study for final diagnosis. Their treatment is about the same. Surgical excision is used when possible, but interstitial radiation is relied on when features are to be saved, and it is usually employed in the parotid region in children in an attempt to preserve the seventh cranial nerve.

In all these growths the microscopic picture bears little relation to the seriousness of the clinical picture. The most benign-appearing lesion can be malignant by position or involvement, or in relation to the excessive difficulty of care and repair. Regarding malignant tendencies, these growths can cause death, which is the true meaning of malignancy, without appearing malignant microscopically. This is another instance in which the clinical picture is of greater importance than the microscopic findings.

JOHN E. KIRKPATRICK, M.D.

End Results in the Treatment of Malignant Melanoma: A Report of 1,190 Cases. GEORGE T. PACK, DAVID M. GERBER, and ISABEL M. SCHARNAGEL. *Ann. Surg.*, 1952, 136: 905.

This report is based upon an experience with 1,190 cases of malignant melanoma treated and followed up during the period from 1917 to 1950. The analysis is unique because it covers the largest series of malignant melanomas ever analyzed and reported, the entire group of patients were under the management of one department with group judgment and control, and the span of years during which the diagnoses were made and treatment was given was long, affording an unusual opportunity to evaluate the changing and improving principles of therapy.

All of the cases in this study have had histologic confirmation of the clinical diagnosis of malignant

melanoma. The study of malignant melanoma is important because (1) the majority of these "black cancers" originate from long-standing pre-existent nevi, (2) the majority of melanomas would be prevented by the judicious excision of dangerous nevi, (3) the constant visibility of the tumor should enable an early diagnosis to be made, and (4) although the melanoma is the most accessible of all major forms of cancer, it has the distinction of the lowest curability.

Of the total 1,190 patients in the series 809 are dead or lost to follow-up observation, while 381 are living with or without evidence of melanoma. Therefore, the total percentage of survival is 32.0. This is not a 5 year figure since it includes those living with recurrent melanoma as well as those living free of evidence of recurrence for less than 5 years. For the purpose of a 5 year evaluation of the end results only 744 patients treated in the period from 1917 to 1945 are considered. Of these, 575 are in the determinate group which could be followed up and in which there were none who died of other causes. The number of patients free of evidence of melanoma 5 years or more is 123. This number represents 21.4 per cent of 5 year definitive cures based on the 575 determinate cases, or 16.5 per cent based on 744 total cases. A steady improvement in the end results in the 5 year periods from a low of 10.0 per cent in the 1917 to 1925 period to a high of 27.6 per cent in the 1936 to 1940 period is encouraging. In melanoma a 5 year postoperative period without evidence of recurrence is quite valid as a criterion for cure, although there are a few unusual instances of patients who survived more than 5 years with residual melanoma present.

A study of the end results in the treatment of melanoma according to anatomical location showed low 5 year survival rates for oronasal and anorectal lesions, for lesions involving the trunk, and for cases in which the primary site was unknown. There was a relatively high 5 year survival rate for subungual lesions and for those involving the palm. Discovery and diagnosis of oronasal and anorectal lesions are usually delayed because the regions are seldom examined thoroughly in a routine physical examination. Furthermore, surgical treatment of melanomas in these regions is apt to be too conservative. In the case of melanomas of the trunk a probable explanation of the low survival rate is that the regional lymphatic drainage is potentially widespread. The results for melanomas of the extremities are much better because the regional metastases spread initially usually to one lymph node-bearing region. The high curability of subungual lesions can be explained by the fact that the usual treatment is amputation of the entire digit.

The 5 year end results according to sex showed 15.6 per cent definitive cures for men and 27.4 per cent for women, but it is doubtful that there is a real sex difference in the prognosis for melanoma. It is believed that the apparent difference is due to the fact that women are more cancer conscious than men and tend to see their doctors earlier because of a mole that is changing appearance. With respect to age, the results do not show any significant difference in survival after the onset of puberty.

There were 73.3 per cent of malignant melanomas in the operable group. Delay in obtaining definitive surgery more than a month after adequate local excision reduced the 5 year cures from 39.9 per cent to 17.0 per cent. Radium and external irradiation are no longer used as primary forms of therapy. Surgical procedures have been divided into four groups: (1) wide local excision, (2) wide local excision plus radical dissection of the adjacent regional lymph nodes, (3) wide local excision in continuity with radial dissection of the adjacent lymph nodes, and (4) radial amputation of an extremity. Wide local excision is always three dimensional, referring to a wide removal of skin, subcutaneous tissues, and fascia to such an extent that closure of the wound by skin grafting or transposed skin flaps is often necessary. The 5 year end results in relation to regional lymph node metastases are 14.1 per cent for patients with nodes positive for metastases, and 40.5 per cent for those with lymph nodes free of metastatic melanoma.

The importance of obtaining proper surgical treatment of melanoma without delay cannot be overemphasized. The best chance for cure is at the time of first excision. JOHN L. LINDQUIST, M.D.

Rhabdomyosarcoma of Skeletal Muscle. GEORGE T. PACK and WARREN F. EBERHART. *Surgery*, 1952, 32: 1023.

This comprehensive article on rhabdomyosarcoma of skeletal muscle is based on a series of 100 cases seen in the 20 year period from 1929 to 1949. In each case there was histologic verification of the diagnosis. The study concerns the malignant, myoblastic tumors of skeletal muscle with exclusion of the visceral, lingual, and cardiac muscle tumors.

When one considers the enormous amount of voluntary muscle comprising the human body the incidence of muscle tumors is amazingly low. The rarity of rhabdomyosarcoma must be due to the fact that striated muscle cells are completely differentiated and do not undergo cellular division in postnatal life. For some unexplained reason these tumors occur with somewhat greater frequency in men than in women (61 to 39 in this series). They occur at all ages, from early infancy to extreme old age, with a predominance in the middle and older age groups and the highest incidence in the sixth decade. Rhabdomyosarcomas may originate from pre-existing benign myomas but in the majority of cases seem to develop de novo. There is no evidence to indicate that postnatal influences contribute to the genesis of these tumors. Trauma plays no role in their causation, but the limb or part containing the tumor is more disposed to injury, with the result that treatment is often delayed because of the mistaken diagnosis of charleyhorse.

The gross appearance of the tumor exhibits considerable variation. It may be single, multilobulated, or even multicentric in origin. Although grossly the tumors appear to be encapsulated or infiltrating, the appearance of encapsulation is an illusion, since the neoplasm extends far beyond the edge of the circumscribed growth. There is great variation in the degree of hardness, depending upon the collagen content, and the connective tissue component differs greatly in quantity. The softness also depends upon the degree of vascularity, the existence of myxomatous changes, and the amount of cystic degeneration. Extensive intratumoral hemorrhage occurs so that the lesion may bear a clinical resemblance to a large hematoma. The quantity of intramural hemorrhage contributes to a marked anemia. These pathologic features underlie two surgical difficulties in the removal of such a tumor: (1) the hazard of excision without rupturing the tumor and causing spillage into the operative wound; and (2) the amputation or dissection must be well above the superior limit of extravasated tumor tissue along the fascial planes. The multiplicity and the occasional multicentricity of these tumor nodules have not yet been generally appreciated by pathologists and surgeons. This consideration offers the logical reason why the radical dissection should include removal of the entire muscle or even the group of muscles in which the tumor develops.

The regional distribution of rhabdomyosarcoma does not follow the pattern of most other soft part sarcomas inasmuch as there is a predilection for the lower extremity and particularly the thigh muscles. The lower extremity, including the buttock and groin, was the site of the tumor in 54 per cent of the cases; the upper extremity, including the shoulder, was involved in 34 per cent. The individual muscles most often affected were the quadriceps, the adductors of the thigh, the biceps, and the brachialis.

Tumors of skeletal muscles would seem to be so accessible that early diagnosis and treatment would be the rule, but the deep location and the usual absence of pain with rhabdomyosarcomas tend to delay the diagnosis until the tumor has reached bulky proportions. The deeply situated tumor may give the false impression of immobility, but it is seldom fixed. Mobility can usually be demonstrated when the muscle is relaxed. The rate of growth of this tumor is extremely variable, and metastases do not occur consistently. However, the vascular supply is abundant and the tumor tends to metastasize early to the lungs, which are by far the most frequent site for metastases. Metastases to regional lymph nodes occurred in 6 per cent of this series.

Rhabdomyosarcomas are relatively radioresistant and radiation therapy alone is not sufficient to sterilize the average tumor. The authors occasionally resorted to preoperative radiation to convert a technically inoperable sarcoma to one which could be successfully removed, and have employed postoperative radiation as an adjunct to radical local dissection. They affirm that radiation therapy should never delay surgical treatment if the sarcoma is operable and should never be substituted for surgical treatment so long as a cure remains possible. Radiation cannot be depended upon to prevent local recurrence when it is given following inadequate local excision. Treatment in their patients consisted of surgical excision, radiation (preoperatively and postoperatively), radium, and amputation. Very few patients were treated exclusively by one form of therapy. Surgical excision as the initial method was done in 58 cases. In 7 patients it was the only treatment.

The choice between radical surgical dissection and amputation depends on such factors as the degree of malignancy, the regional location, the fixity or mobility, the primary or recurrent status, the presence of regional and distant metastases, and the experience and judgment of the operator. If the tumor is attacked directly for local removal, dissection should be performed gently with meticulous care, and retraction should always be away from, rather than toward, the tumor. The soft tissues encompassing the lesion should never be compressed or handled roughly. If the rhabdomyosarcoma is located on an extremity, a tourniquet is applied proximally well above the tumor. If the attempt at local removal fails or appears futile, an immediate amputation is performed above the level of the tourniquet. Because gross and microscopic study of the veins removed with the specimen in some cases has revealed the presence of intravascular tumor thrombi, which theoretically could have been dislodged at operation or could have propagated centripetally, routine ligation of the axillary, superficial, or deep femoral veins prior to the local removal of sarcomas of the extremities has been advocated. If any previous surgery has been done and the surgeon decides to attempt radical dissection, it is imperative that a wide elliptical excision of skin be made far beyond the limits of the original scar.

Although not always possible of achievement, a good rule to follow is to remove the sarcoma without seeing or encountering it. Many sarcomas appear encapsulated but the great temptation to enucleate them should be avoided. Myomectomy is always too conservative. In more recent years the authors have routinely removed the entire group of muscles involved by or encompassing the sarcoma from their origins to their insertions. Ruthless removal of adherent or implicated arteries and nerves is practiced. If amputation is decided upon, the general rule of amputating above the level of origin of the muscle groups involved should be followed. Rhabdomyosarcomas of the chest wall should be attacked most aggressively at the initial attempt in an all-out effort to cure. If a sarcoma of the soft parts metastasizes to the lungs as a spherical growth and a single metastatic focus is seen, it is entirely feasible and proper to remove this tumor either by segmental resection or lobectomy. Experience shows that the procedure has definite palliative value.

The end results of treatment in this series show a cure rate of 33.8 per cent, the highest yet reported in the medical literature. Of 65 patients with determinate cases, 22 are now living and well for more than 5 years from the date of primary treatment without recurrence during the elapsing interval. Five of these 22 patients survived for more than 10 years. The curability of rhabdomyosarcomas in the arm was 3 times as great as the curability for tumors located in the thigh. The prognosis for rhabdomyosarcoma was better in childhood and early life than in patients of middle age and in later life. A number of patients with recurrent, operable rhabdomyosarcoma are living and well 5 years after treatment by the authors.

JOHN L. LINDQUIST, M.D.

EXPERIMENTAL SURGERY

Renal Lesions and Function Following Prolonged Experimental Hypotension. MELVIN A. BLOCK, KHALIL G. WAKIM, FRANK C. MANN, and WARREN A. BENNETT. *Surgery*, 1952, 32: 551.

Decreased renal function following shock has been recognized clinically in man, and it is well established that there is marked diminution in renal function during the period of shock or hypotension in man and in the dog. However, the demonstration of renal dysfunction or renal lesions following recovery from experimental shock or hypotension is a difficult problem. Dogs die during the period of shock or, if they recover, they will regain essentially normal renal function.

Prolonged experimental hypotension in dogs obtained by transfusing their blood into a reservoir until a blood pressure of 70 mm. of Hg was reached and maintained for periods up to 26 hours caused marked degenerative changes in the kidney. The renal lesions which occur in prolonged hypotension are ischemic in origin and vary greatly in severity and extent, from focal areas of mild degenerative changes in the tubules to bilateral cortical necrosis. Cortical infarcts were frequent. Hypotension had to be maintained for more than 6 hours before significant lesions occurred. The renal damage usually was sufficient to produce death from renal failure. The lesions were usually restricted to the cortex. The lesions result from renal vasoconstriction in addition to prolonged decrease in the blood pressure and flow to the kidney. The most severe injury observed was located in the proximal convoluted tubules.

The lesions produced in hypotension are distinguished from those seen in hemoglobinuric nephrosis in the so-called lower nephron nephrosis, and from conditions in which acute renal tubular degeneration is associated with pigment casts.

JOSHUA ZUCKERMAN, M.D.

Experimental Treatment of Uremia with Renal Transplantation (Traitement experimental de l'uremie par transplantation renale). L. LEFEBVRE. *J. urol. med.*, Par., 1952, 58: 225.

Kidneys were grafted in the neck of bilaterally nephrectomized dogs by Brull's technique. The kidney with its vessels and ureter in the "donor" dog was mobilized. The carotid artery and jugular vein of the "perfusing" dog were then cannulated with vitallium cannulas, the vessels and ureter of the donor kidney were divided, the kidney was brought to the neck, and vascular anastomosis was performed rapidly. A plastic sound introduced into the ureter was brought out through a stab wound. Penicillin (50,000 units daily) was found to be essential in maintaining life in the perfusing dog.

The transplanted kidney began to function a few minutes after the anastomosis was completed. Its normally firm consistency and red brown color returned almost instantaneously and diuresis, sometimes marked, followed. The initial polyuria persisted as long as the kidney survived, although it became less marked. The ability to excrete urea progressively increased, so that in 60 to 72 hours after the transplantation the uremia had disappeared. In 60 per cent of cases, the nephrectomized dog presented an acidosis with a carbon dioxide level below 30 volumes per cent, which the transplanted kidney brought back toward normal in 1 to 5 days. Forty-eight hours after nephrectomy the dogs had become apathetic and anorexic, vomited, and had diarrhea; all these symptoms were rapidly improved by the transplanted kidney.

Arrest in the function of the transplanted kidney was brought about by ascending infection or by necrosis of the ureteral stump; there was no histologic or physiologic evidence of incompatibility of the transplanted tissue. Hypertrophy of the transplanted kidney, two to three times its initial weight, was frequently observed and this should be taken into account in preparing the bed for the transplant.

Perfusion of the donor kidney with physiologic saline and storage at low temperature for 24 hours was compatible with resumption of function following transplantation. JONAS BRACHFELD, M.D.